**Crab Creek Subbasin:**
**Telford Unit/Swanson Lakes Wildlife Area**
**Assessment and Inventory**

## Introduction

This portion of the Crab Creek Subbasin Plan is narrowed down in scope, from Crab Creek in general, to the "Telford Unit." However, nearly all available assessment and inventory information for the Telford Unit is narrowed down even further, specifically to the Swanson Lakes Wildlife Area. This data is generally contained in the documents for **Project ID 199106100: Swanson Lakes Wildlife Area**, submitted for the FY 2002 Bonneville Power Administration Provincial Project Review.

These documents contain the following types of assessment information: general and biophysical description, overview of data collection, analysis and synthesis, and terrestrial vegetation and wildlife resources.

They also contain the following types of inventory information:  management programs and policies, existing plans, biological assessments, past/present/planned assessments, and research, monitoring and evaluation information, budgets, and relationships to other projects.

The documents are inserted below, with updates made where appropriate.

## 1. FIRST DOCUMENT:

**Project ID:** 199106100

**Title:** Swanson Lakes Wildlife Area (SLWA)
Section 9 of 10. Project description


### a. Abstract

Established in 1993, the 8,094 ha (20,000 ac) Swanson Lakes Wildlife Area (SLWA) is managed by the Washington Department of fish and Wildlife (WDFW) primarily to support sharp-tailed grouse recovery efforts within Washington Department of Fish and Wildlife's Sharp-tailed Grouse Management Zone Four. The SLWA mitigation project is the "core" property within WDFW's Sharp-tailed Grouse Management Zone Four and is currently occupied by approximately 180 sharp-tailed grouse (Schroeder pers. comm. 1999). WDFW's primary biological goal is to establish and maintain a viable sharp-tailed grouse population at the Swanson Lakes Wildlife Area.  Similarly the primary biological objective is to increase the sharp-tailed grouse population to at least 400 grouse by 2010 through habitat manipulation, maintenance, and protection measures, and by natural recruitment and population augmentation if necessary. Mule deer, sage grouse and numerous shrub-steppe obligate species are also high priority management species at the SLWA.

The SLWA is comprised of lands purchased and/or owned by WDFW (2,517 ha/6,220 ac), Bonneville Power Administration (5,059 ha/12,500 ac), and the Washington Department of Natural Resources (518 ha/1,280 ac). In addition, the Bureau of Land Management (BLM) owns approximately 6,071 ha (15,000 ac) that adjoins SLWA on the south.

Habitat enhancement, maintenance, and protection measures include grassland seedings, winter food plot developments, shrub and tree plantings, weed control actions, and fence construction/maintenance activities. Monitoring includes measuring both wildlife and habitat response to habitat manipulation, alteration, and protection measures through sharp-tailed grouse lek counts, neotropical bird surveys, hunter harvest bag checks, big game surveys, Habitat and Evaluation Procedure (HEP) surveys, and vegetation transects.

**b. Technical and/or scientific background**

The Swanson Lakes Wildlife Area mitigation project (Figure 1) addresses declining quantity and quality of shrubsteppe habitat and subsequent negative impacts on the distribution and populations of shrubsteppe obligate species such as sharp-tailed grouse, sage grouse, Washington ground squirrels, sage thrashers, sage sparrows, Brewer's sparrows, loggerhead shrikes, and ferruginous hawks within a portion of the Crab Creek Subbasin (Vander Haegen et al. 2000, WDFW 2000). Many of these species have been adversely impacted by habitat conversion to alternate uses, such as irrigated and dry land agriculture, water conversion to alternate uses, such as irrigated and dry land agriculture, water impoundments associated with dams, and urban/residential development resulting in current distributions that are dramatically reduced from their historic ranges.

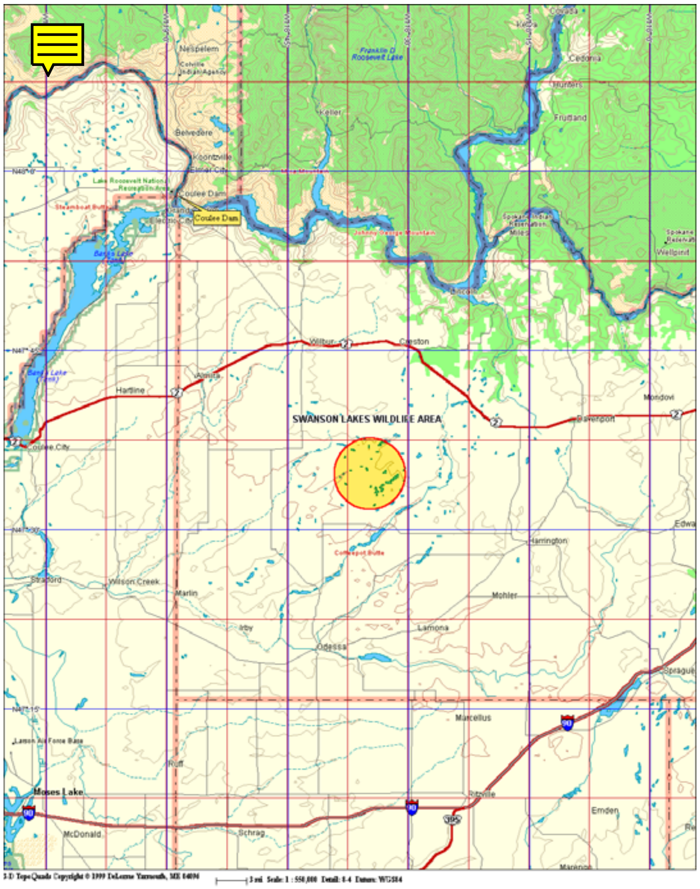



Figure 1. General location map for the Swanson Lakes Wildlife Area.

Daubenmire (1970) suggested the vast majority of the Crab Creek Subbasin historically consisted of shrubsteppe habitat (Figure 2). Changes in the landscape related to habitat conversion that have affected shrubsteppe wildlife include: fragmentation of extant shrubsteppe habitat, loss of deep-soil communities, and alteration of the vegetation community resulting from grazing by livestock, invasion by exotic plants, and increased fire frequencies (Vander Haegen et al. 2001). SLWA project management activities address these habitat/landscape concerns as follows:

<u>Habitat fragmentation</u>: The 8,094 ha (20,000 ac) SLWA is contiguous with 6,071 ha (15,000 ac) of BLM land for a total project area of 14,165 ha (35,000 ac), (Figure 3).

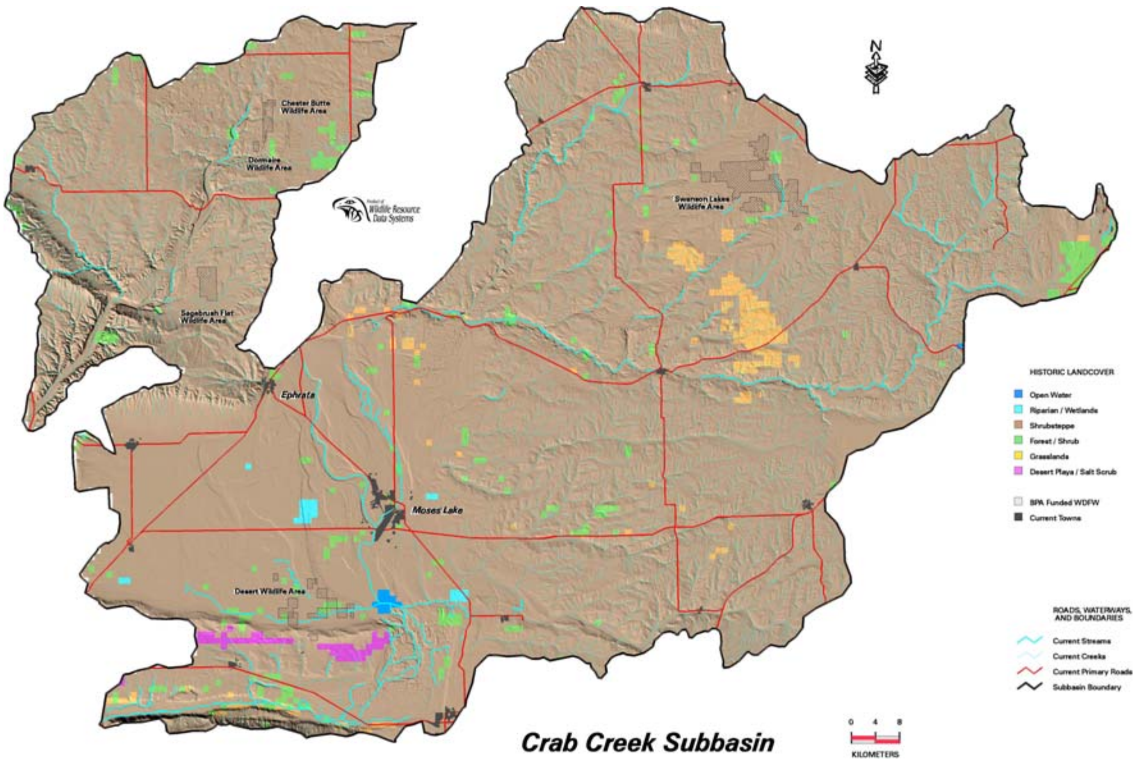



Figure 2. Historical cover types in the Crab Creek Subbasin.

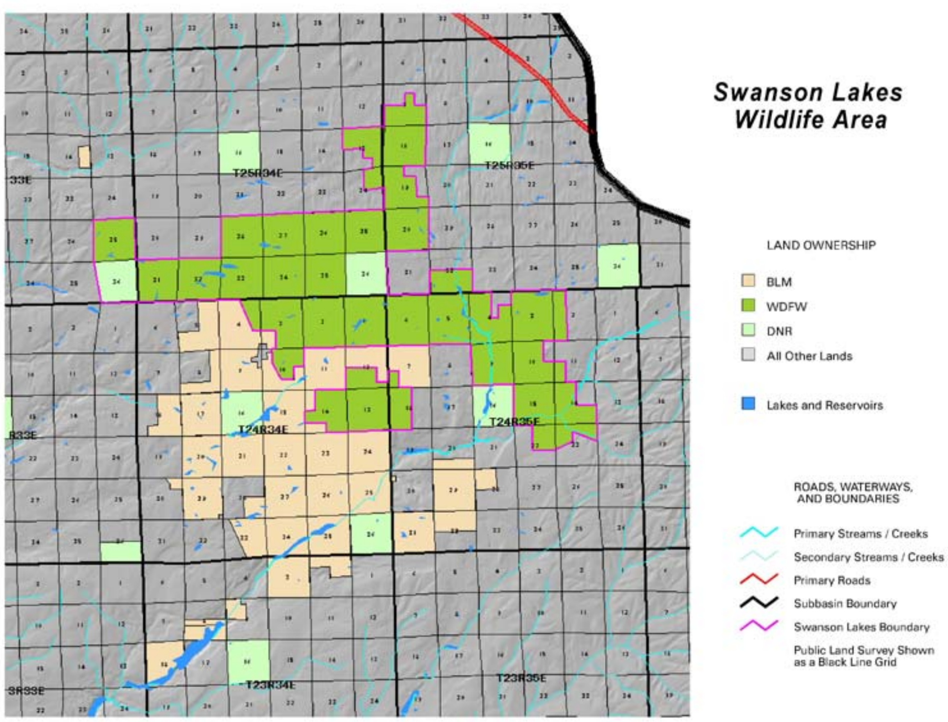



Figure 3. Map delineating WDFW, BLM, and DNR property.

<u>Loss of deep soil communities</u>: Over 243 ha (600 ha) of native–like vegetation has been re-established on deep soils formerly used as agricultural fields.

<u>Alteration of plant community (grazing):</u> Grazing has been discontinued and will only be used in the future as a management tool to accomplish specific habitat/vegetation objectives in accordance with site specific management objectives, WFGW

guidelines, and HB 1309 directives. The SLWA is fenced to protect habitats from trespass livestock grazing and to control vehicle access.

Alteration of plant community (exotic plant species): Approximately 364 ha (900 ac) are treated annually to reduce non-native weedy vegetation. Treatments include herbicides, mechanical measures, and biological agents (insects). If needed, native perennial bunchgrasses are planted in treated areas to supplant weedy vegetation.

Alteration of plant community (increased fire frequencies): Uncontrolled wildfires can significantly alter the landscape by eradicating sagebrush which shrubsteppe obligate species such as sage grouse depend upon for both food and cover (big sagebrush, *Artemesia tridentata*, is killed by fire). Fire fighting contracts with local fire districts and the Washington Department of Natural Resources (DNR) are in place at SLWA to ensure timely response to wildfires (controlled burns can be an appropriate tool to achieve habitat objectives).

The Swanson Lakes Wildlife Area is predominantly shrubsteppe habitat that includes both grasslands and shrublands. Cover types and approximate acreages are shown on Table 1.

Table 1. Swanson Lakes Wildlife Area cover types/acres.

| Cover Type | Acres |
|---|---|
| Shrub-steppe | 14,676 |
| Ephemeral pond | 98 |
| Lacustrine | 132 |
| Wetland | 83 |
| Wet meadow | 1,754 |
| Riparian Shrub | 35 |
| Conifer | 1 |
| Cliff/Talus | 485 |
| Agriculture | 275 |
| Conservation Reserve (CRP) | 2,396 |
| Farmstead | 65 |
| TOTAL | 20,000 |

Wildlife/habitat management activities at the Swanson Lakes Wildlife Area focus primarily on recovery of sharp-tailed grouse and, to a lesser extent, sage grouse. Sharp-tailed grouse were historically found in shrubsteppe and deciduous shrub habitats throughout eastern Washington, but have declined 94% between 1960 and 2000 (Schroeder et al. 2000). The current population in Washington is estimated to be around 600 and is listed as a threatened species by the state of Washington. (Schroeder et al. 2000). Approximately 33% of the remaining birds are found within the Crab Creek Subbasin. The subbasin includes 6 zones designated for recovery of sharp-tailed grouse populations (Hays et al., in prep.).

Sharp-tailed grouse limiting factors include the lack of and/or availability of shrubsteppe habitat dominated by herbaceous cover (grasses and forbs), the distribution of riparian habitats dominated by deciduous shrubs (winter habitat), and habitat fragmentation. Reduction of riparian forest habitats along the Columbia River as a result of construction of Grand Coulee and Chief Joseph Dams eliminated sharp-tailed grouse wintering habitat (Howerton 1986).

Similarly, sage grouse were historically found in shrubsteppe habitats throughout eastern Washington. Sage grouse populations in Washington declined 77% between 1960 and 1999 (Schroeder et al. 2000b). One of the two remaining populations is centered in Douglas County, within the Crab Creek Subbasin. The subbasin also includes an additional 5 zones designated for recovery of sage grouse populations (Hays et al., in prep.). The current population in Washington is estimated to be about 1,000 and is listed as a threatened species by the state of Washington. (Schroeder et al. 2000a).

The primary limiting factor is the lack of and/or availability of shrubsteppe habitat with a substantial component of herbaceous cover (grasses and forbs). The lack of big sagebrush in shrubsteppe habitats may also limit sage grouse in the Crab Creek Subbasin, but to a lesser extent. Habitat enhancement, maintenance, and protection measures that benefit sharp-tailed and sage grouse also benefit other shrubsteppe obligate species, neo-tropical birds, waterfowl, big game, and upland game birds. There are no fish bearing streams, rivers, or lakes on this site. Therefore, fishery resources are not impacted by this project. The Swanson Lakes Wildlife Area is dedicated, in perpetuity, to management and protection of shrubsteppe habitat and obligate wildlife species.

**c. Rationale and significance to Regional Programs**

The SLWA mitigation project is part of a statewide effort to increase and maintain viable sharp-tailed grouse populations (at least 2,000 grouse) in four management zones within Washington State (WDFW 1995), (Figure 4). Today, sharp-tailed grouse are found in eight relatively small, isolated, subpopulations; one subpopulation is found entirely within the Crab Creek Subbasin (Lincoln County i.e., SLWA project area), and two other subpopulations are on the edge of the subbasin (NW and NE Douglas County). Subpopulations are separated from adjacent subpopulations by at least 20 km (12.5 mi). Sharp-tailed grouse are continuing to decline in Washington due to long-term effects of habitat conversion, degradation, fragmentation, and population isolation (Hays et al. 1998, Schroeder et al. 2000).

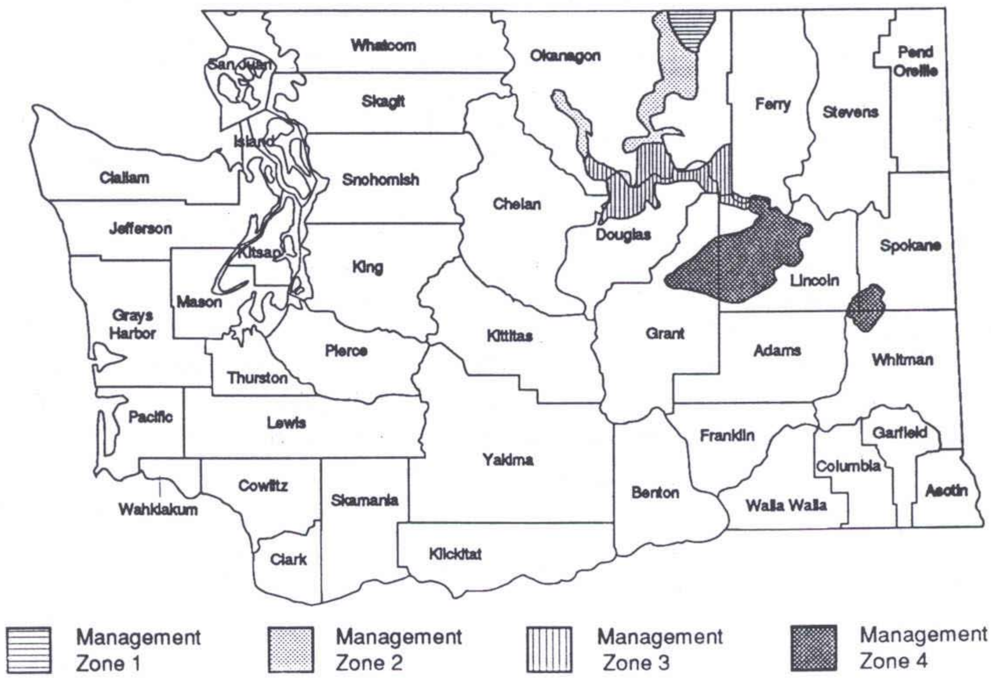



Figure 4. WDFW Sharp-tailed Grouse Management Zones located in Washington State.

The goals and objectives described in the Swanson Lakes Wildlife Area mitigation project management plan (Anderson J., P. R. Ashley 1995) support both WDFW and Crab Creek Subbasin goals and objectives. WDFW, Crab Creek Subbasin, and SLWA sharp-tailed grouse goals and objectives are compared on Table 2.

Table 2. A comparison of WDFW, Crab Creek Subbasin, and SLWA sharp-tailed grouse goals and objectives.

| WDFW State Goal(s) | Crab Subbasin Goal(s) | SLWA Project Goal(s) |
|---|---|---|
| Increase the population size and distribution of sharp-tailed grouse and protect, enhance, and increase shrub/meadow steppe. | Recover populations of sharp-tailed grouse in the Crab Creek Subbasin to the level where populations are viable. | Establish and maintain a viable sharp-tailed grouse population at the Swanson Lakes Wildlife Area. |
| | | Protect, enhance, and maintain 20,000 acres of shrub-steppe habitat for sharp-tailed grouse and other shrub-steppe obligate species. |

| WDFW State Objective(s) | Crab Subbasin Objective(s) | SLWA Project Objective(s) |
|---|---|---|
| Increase the breeding population of sharp-tails from 380 to more than 2,000 distributed throughout four management zones. | Use translocations of sharp-tailed grouse into Washington from populations in other states so that a population of at least 1,000 is supported in the Crab Creek Subbasin by 2010. | Increase the number of sharp-tailed grouse at SLWA from 180 to 400 by 2010. |
| Increase the breeding population of sharp-tails in WDFW's Sharp-tailed Grouse Management Zone 4 to a minimum of 800 grouse. | Conduct research on sharp-tailed grouse through 2005 to monitor population size, determine population viability, and evaluate population responses to habitat alteration | Monitor wildlife and habitat response to protection, maintenance, and enhancement measures annually. |
| Protect at least 98,000 acres of high quality, relatively contiguous (<2 mile gaps) habitat that is currently occupied. | Improve quantity, quality, and configuration of the shrubsteppe habitat necessary to support a viable population of sharp-tailed grouse by 2010. | Implement habitat management activities and schedules described in the SLWA Enhancement Plan. |

The Swanson Lakes Wildlife Area was acquired to partially mitigate for losses resulting from construction of Grand Coulee and Chief Joseph Dams. Sharp-tailed grouse, sage grouse, and mule deer are listed in the loss assessments for both dams (Howerton 1986, Berger, M., and D. Kuehn 1992) and were used as habitat indicator species during the Habitat Evaluation Procedure (HEP) analysis (Berger, Cope 1992). Funding for the SLWA has been provided by BPA under terms specified in the Washington Agreement (MOA).

As an ongoing mitigation project, the SLWA project is consistent with the Northwest Power Planning Council's 2000 Program including, but not limited to the following sections: Overall Vision (Section III A-1) "Wherever feasible, this program will be accomplished by protecting and restoring the natural ecological functions, habitats, and biological diversity of the Columbia River ecostystem….", Planning Assumptions (Section III, A-2) "This is a habitat based program, rebuilding healthy, natural producing fish and wildlife populations by protecting, mitigating, and restoring habitats and the biological systems within them…", Scientific Principles (Section III, B-2) i.e., Principles one through eight, Biological Objectives (Section III, C-1) "Recovery of fish and wildlife affected by the development and operation of the hydro system that are listed under the Endangered Species Act," (Section III, C-2a.4) "Develop and implement habitat acquisition and enhancement projects to fully mitigate for identified losses; Coordinate fish and wildlife activities throughout the basin…; maintain existing and created habitat values; and monitor and evaluate habitat and species responses to mitigation actions," and Wildlife (Section III, D-7) "Complete the current mitigation program for construction and inundation losses and include wildlife mitigation for all operational losses as an integrated part of habitat protection and restoration".

**d. Relationships to other projects**

This project is part of WDFW's statewide effort to establish and maintain viable populations of sharp-tailed grouse. The SLWA project compliments and supports sharp-tailed grouse and shrubsteppe recovery efforts at the Sagebrush Flat Wildlife Area, (1994044), Scotch Creek Wildlife Area (199609400) and on the Colville Confederated Tribes (CCT) (199204800, 21034) and Spokane Tribe of Indians (STOI) Reservations.

WDFW in conjunction with the CCT and STOI is developing strategies to establish and maintain meta populations within the Crab Creek, Okanogan (Cascade Columbia Province), and Lake Roosevelt (Mountain Columbia Province) subbasins i.e., viable populations at the SLWA, Sagebrush Flats (West Foster Creek Unit), and Scotch Creek Wildlife Areas and CCT and STOI Reservations (Figure 5). Sharp-tailed grouse are currently present on all areas except the STOI Reservation. The overall vision for this cooperative effort is to share information, conduct joint habitat evaluations and research on sharp-tailed grouse, translocate grouse between isolated populations to increase genetic variability, and to establish new populations to link existing disjunct populations.

WDFW and the CCT have cooperated on sharp-tailed grouse radio telemetry studies both on and off reservation lands (McDonald 1998). Furthermore, sharp-tailed grouse captured on the CCT reservation have been used to supplement remnant grouse populations at the Scotch Creek Wildlife Area.

The FCRPS Biological Opinion identifies the importance of functioning aquatic habitat as in RPA 150. Similar actions should be taken when possible regarding terrestrial habitat.

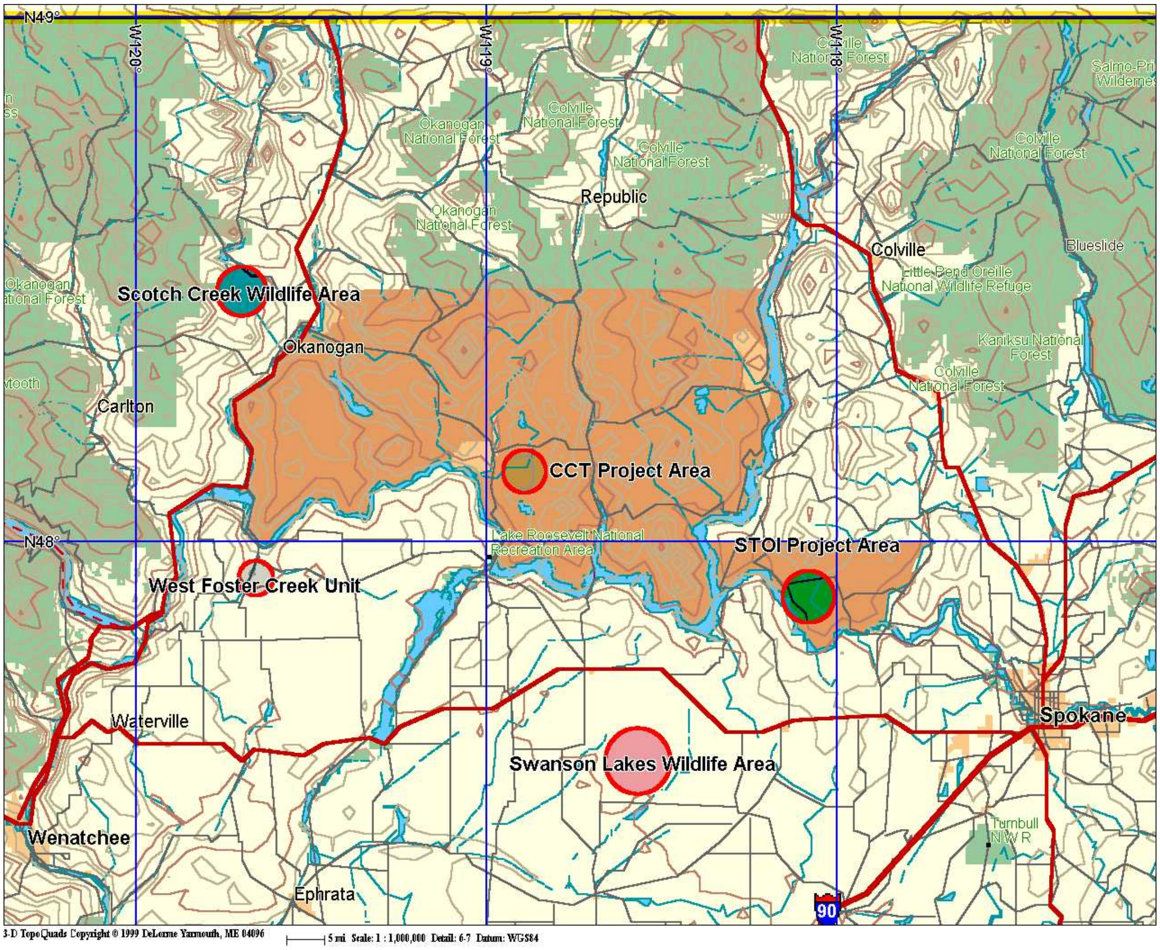



Figure 5. Sharp-tailed grouse cooperative project sites.

**e. Project history** (for ongoing projects)

Swanson Lakes Wildlife Area management strategies address several critical landscape level limiting factors such as shrubsteppe habitat conversion, degradation, and fragmentation (Hays et al. 1998, Schroeder et al. 2000), (Figure 6) as well as species-specific limiting factors. Management activities that have been implemented to address habitat conversion and degradation factors include seeding agricultural fields to native-like vegetation, removing livestock, protecting and maintaining existing habitat, and controlling introduced vegetation (Anderson and Ashley1993). These activities and strategies also address factors that limit local populations of sharp-tailed grouse and sage grouse such as quality and availability of nesting and wintering habitat (WDFW 1995, WDFW 1995a). The large project acreage and contiguous nature of the parcels that comprise the wildlife area reduces shrub-steppe habitat fragmentation within this portion of the subbasin.

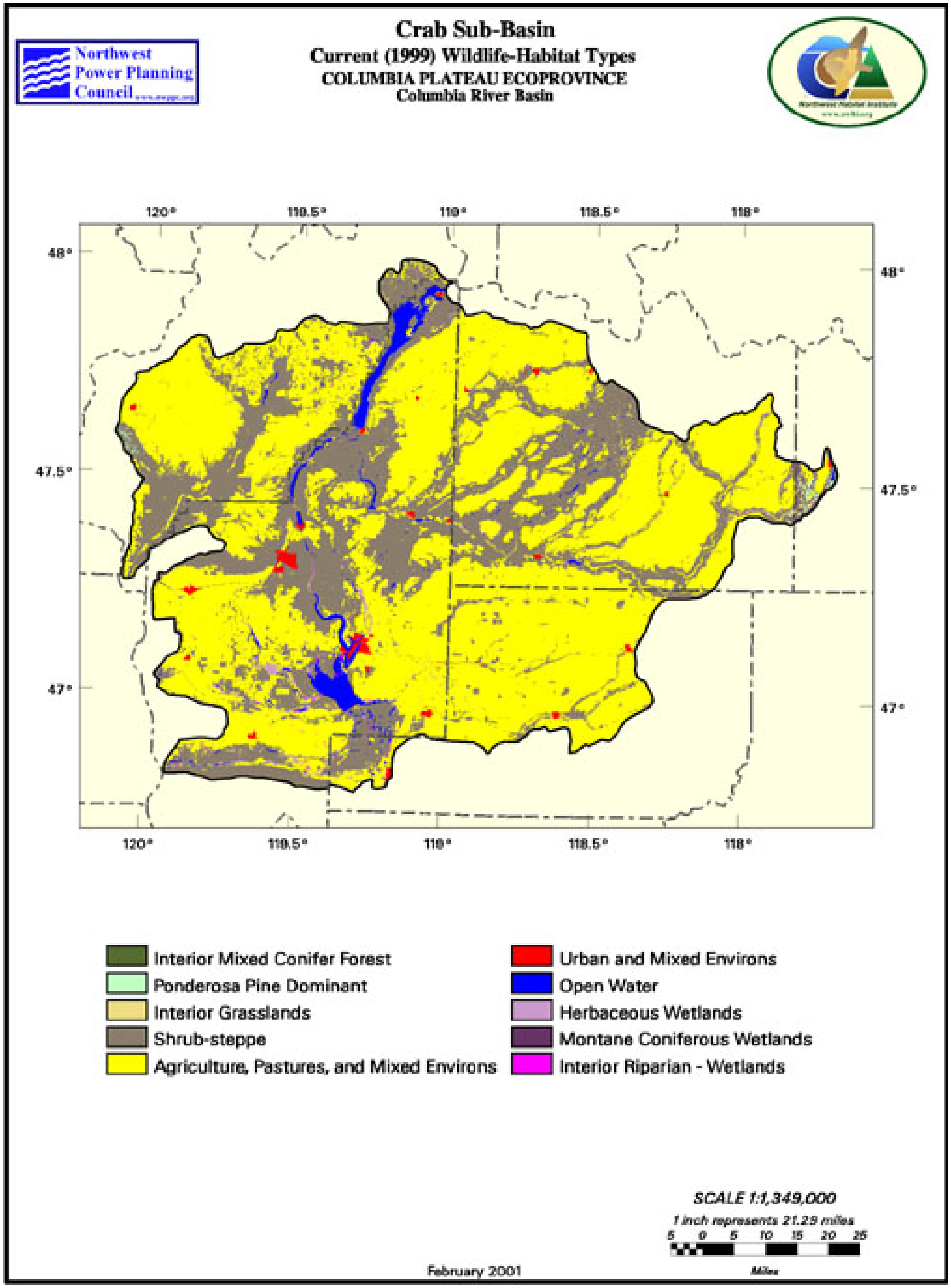



Figure 6. Map depicting present fragmented shrub-steppe habitat coverage within the Crab Creek Subbasin.

The following major enhancement, protection, and maintenance activities have been accomplished at the Swanson Lakes Wildlife Area.

1. Over 93 km (58 mi) of new fence has been constructed to protect and maintain critical shrubsteppe habitat for sharp-tailed grouse, sage grouse, mule deer, and other shrubsteppe obligate species (Appendix A). The wire configuration on new fence includes a “smooth” bottom wire to reduce potential injury to wildlife crossing the fence. An additional 62 km (39 mi) of existing fence has also been restored. Approximately 85 km (53 mi) of interior fencing has been removed to reduce potential wildlife injury/mortality due to entanglement and collision with unneeded barbed wire. Four kilometers (2.5 mi) of new fencing is needed to protect recent/projected acquisitions. Fencing primarily protects habitat against trespass livestock grazing and vehicular traffic that reduces herbaceous cover used for nesting and foraging and/or creates disturbance, which promotes the spread of undesirable weedy vegetation.

2. Over 18,000 shrubs and trees have been planted to provide winter habitat for sharp-tailed grouse, increase vegetative diversity across the landscape, and to replace the shrub component that was severely impacted by decades of livestock grazing which occurred prior to WDFW’s ownership. Preliminary plans called for planting over 80,000 shrubs and trees; however, after monitoring shrub and tree response to elimination of livestock grazing over several years, SLWA project staff determined that natural shrub/tree regeneration reduced the need to plant the number of trees and shrubs described in the management plan (Anderson and Ashley1993). Shrub/tree survival is approximately 25 percent at this juncture. Adkins (1980) rated 25 percent survival as “fair” for non-irrigated upland wildlife shrub/tree plantings in xeric areas of eastern Washington. Between 6,000 and 12,000 shrubs/trees will be needed in the future to fill gaps on existing project lands and for future acquisitions. The actual number planted will be largely predicated on site specific edaphic features and water table, stream, and/or pond fluctuations/levels.

3. Food plots (Figure 7) comprised of wheat (16 ha/40 ac) were seeded and left standing along with 17 ha (42 ac) of sharecropper grain to provide sharp-tailed grouse winter feed while shrubs and trees are re-established on the SLWA (sharp-tails feed on shrub/tree buds and fruit during winter). Food plots will remain part of WDFW’s long-term sharp-tailed grouse management strategy at the SLWA, because sharp-tailed grouse may have adapted locally to depend upon small grains for winter food in the absence of suitable shrubs and trees (Thompson pers. comm. 1999).

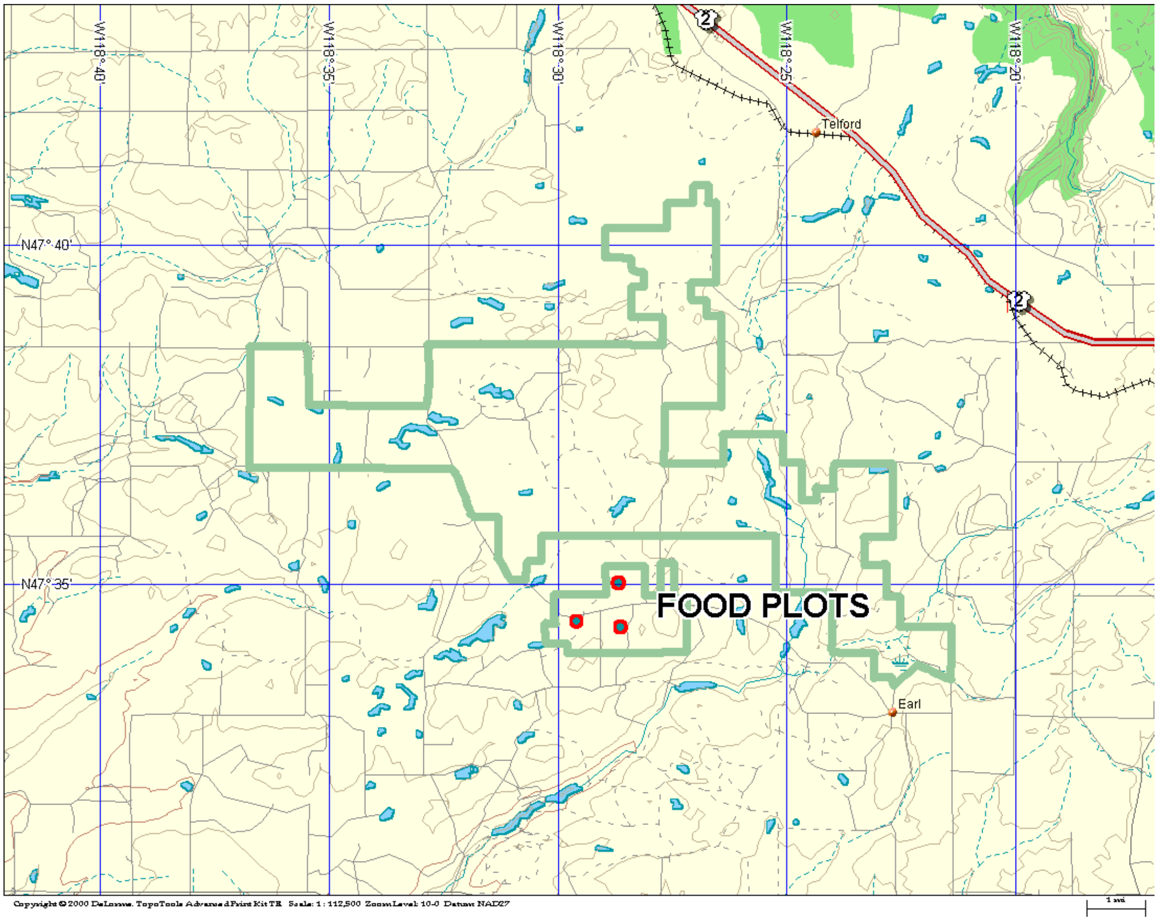



Figure 7. Location of sharp-tailed grouse food plots.

4. Approximately 243 ha (600 ac) of agricultural land have been converted to native-like grasslands. The locations of past and future grassland enhancements are depicted in Appendix B. The results of HEP/vegetation transects replicated in 2000 indicate that "visual obstruction readings" (VOR) have decreased significantly on undisturbed soil bank and CRP grasslands since baseline transects were conducted in 1992 (VOR is used to evaluate nesting cover for sharp-tailed grouse and other species). As a result, an additional 425 ha (1,050 ac) of existing soil bank and CRP grasslands will be reseeded to native-like herbaceous vegetation and/or undergo disturbance treatments such as mowing, harrowing, or controlled burns to increase vegetation diversity, improve nesting cover, and/or increase plant vigor (adaptive management). The following paragraphs provide a <u>brief</u> synopsis of HEP/vegetation transect VOR monitoring results on grasslands.

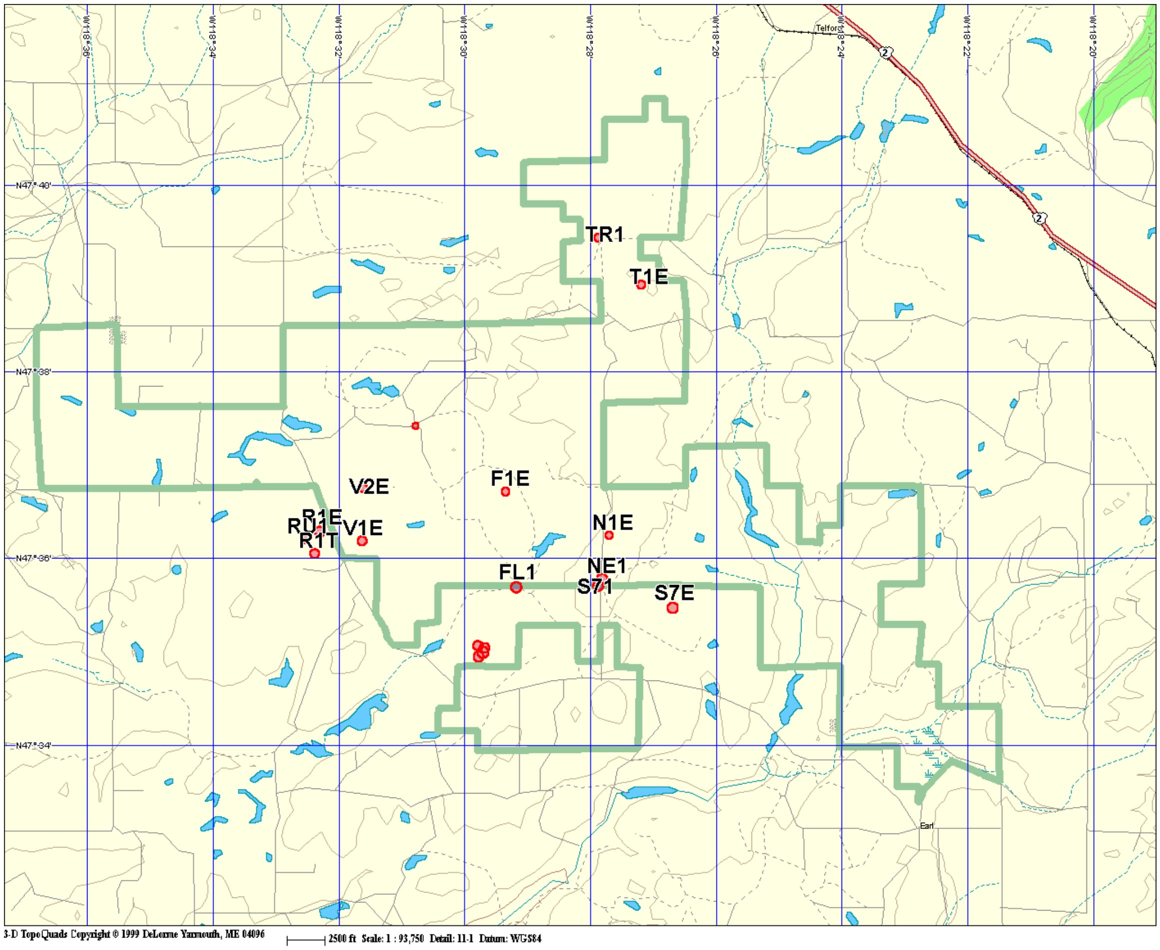



Figure 8. HEP transect locations at SLWA.

In 2000, WDFW staff initiated replication of 1992 baseline HEP/vegetation transects on the SLWA (Figure 8) as well as established permanent monitoring stations as described in the monitoring section. Not all baseline transects were replicated nor were all planned permanent monitoring stations established (this will be accomplished over the next two years).

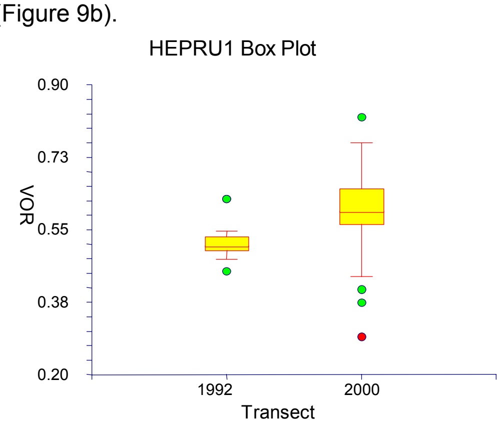
Hypothesis Tested

The following hypothesis were tested: the null hypothesis ($H_o$): VOR measurements observed in 1992 and 2000 are equal; alternative hypothesis 1 ($H_{A1}$): VOR measurements observed in 1992 are greater than VOR measurements recorded in 2000; and alternate hypothesis 2 ($H_{A2}$): VOR measurements observed in 1992 are less than VOR measurements recorded in 2000.

Test Results

Data was analyzed using two sample tests i.e., Equal Variance T Test and Aspin – Welch Unequal Variance Test (NCSS/PASS 2000), (Hintze 1999) were compared with similar results. Power analysis results were high (range: 0.88 to 1.0- Alpha = 0.05; range 0.79 to 1.0-Alpha = 0.01).

The only increase in VOR observed on the three transects during the eight year period occurred on the grazed (disturbed) grassland parcel (Figure 9). Mean VOR increased from 0.5dm to 0.6dm. In contrast, mean VOR decreased on non-grazed grasslands. Mean VOR on transect HEPVI1 (Figure 9a) decreased from 2.1dm to 0.8 and from 1.2dm to 0.4 dm on transect HEPFI1 (Figure 9b).



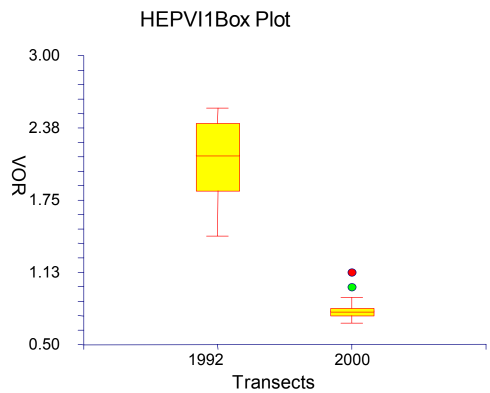

Transect: HEPRU1

Cover type: Soil Bank Grassland (introduced grass species)

Grazing/disturbance regimen(s): Rotational grazing regimen (not grazed in 1999).

Ownership: BLM

Figure 9. VOR[1] transect results on grazed grassland (soil bank) at Swanson Lakes WA.



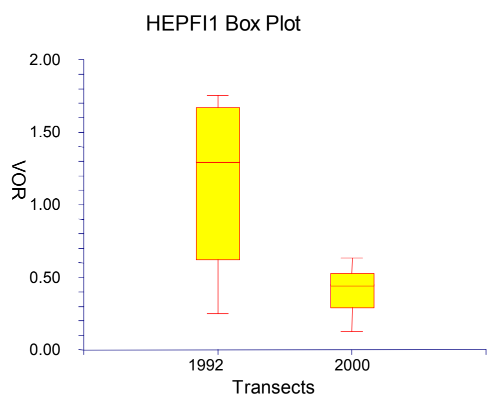

Transect: HEPVI1

Cover type: CRP Grassland (introduced grass species)

Grazing/disturbance regimen(s): Not grazed or disturbed

Ownership: WDFW

Figure 9a. VOR transect results on non-grazed grassland (CRP) at Swanson Lakes WA.




Transect: HEPFI1

Cover type: CRP Grassland (introduced grass species)

Grazing/disturbance regimen(s): Not grazed or disturbed

Ownership: WDFW

Figure 9b. VOR transect results on non-grazed grassland (CRP) at Swanson Lakes WA.

Discussion

Prior to BLM ownership of land represented by the data from transect HEPRU1 (Figure 10), unrestricted season long grazing occurred annually. In contrast, BLM stewardship called for a rest/rotation grazing regimen in conjunction with a ten year lease granted to the former landowner. In addition to changes in mean VOR (Figure 9), an increase in vegetation structure on the rest/rotation transect (HEPRU1-2000) is evident (Figure 10). Vegetation structure on transect HEPRU1-2000 is more diverse and shows an increase in overall VOR (minimum VOR required for adequate sharp-tailed grouse nesting cover at the landscape level is 1.0 dm/4 in), (M. Shroeder pers. comm. 1999). The data represented by transect HEPRU1-2000 shows that sharp-tailed grouse nesting habitat improved after a grazing rest cycle (disturbance) and may improve further with additional rest. Statistical power for this analysis is shown on Table 3.

[1] Visual Obstruction Reading (horizontal cover as measured with a Robel pole)

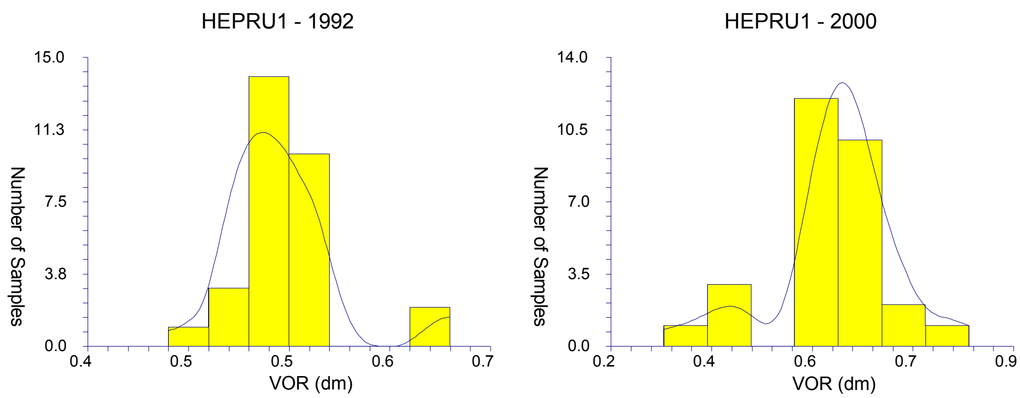



Figure 10. The numbers of samples per VOR and vegetation structure increase from 1992 to 2000.

**Table 3. Power analyses for transect HEPRU1 statistical tests (n = 30).**
**Equal-Variance T-Test Section**

| | **Hypothesis** | **Decision (5%)** | **Power** | **Power** | |
|---|---|---|---|---|---|
| | | | (Alpha = .05) | (Alpha = .01 | |
| | | $H_o$ | Reject | 0.936917 | 0.808072 |
| | $H_{A1}$ | | Reject | | 0.968699 |
| 0.872635 | | | | | |
| | $H_{A2}$ | | Accept | | 0.000000 |
| 0.000000 | | | | | |

**Aspin-Welch Unequal-Variance Test Section**

| | **Hypothesis** | **Decision (5%)** | **Power** | **Power** | |
|---|---|---|---|---|---|
| | | | (Alpha = .05) | (Alpha = .01) | |
| | | $H_o$ | Reject | 0.932051 | 0.789808 |
| | $H_{A1}$ | | Reject | | 0.966751 |
| 0.861158 | | | | | |
| | $H_{A2}$ | | Accept | | 0.000000 |
| 0.000000 | | | | | |

Results of both tests clearly support acceptance of $H_{A2}$ i.e., that VOR measurements observed in 1992 are less than those recorded in 2000. In contrast, data from transects HEPVI1 and HEPFI1, which represents sites owned by WDFW that were not disturbed from 1992 to 2000, shows a significant reduction in mean VOR and habitat structure (Figure 11), (Figure 12). The results clearly indicate that sharp-tailed grouse nesting structure/habitat has declined significantly on these undisturbed sites. Power analysis for transects HEPVI1 and HEPFI1 are shown on Tables 4 and 5 respectively.

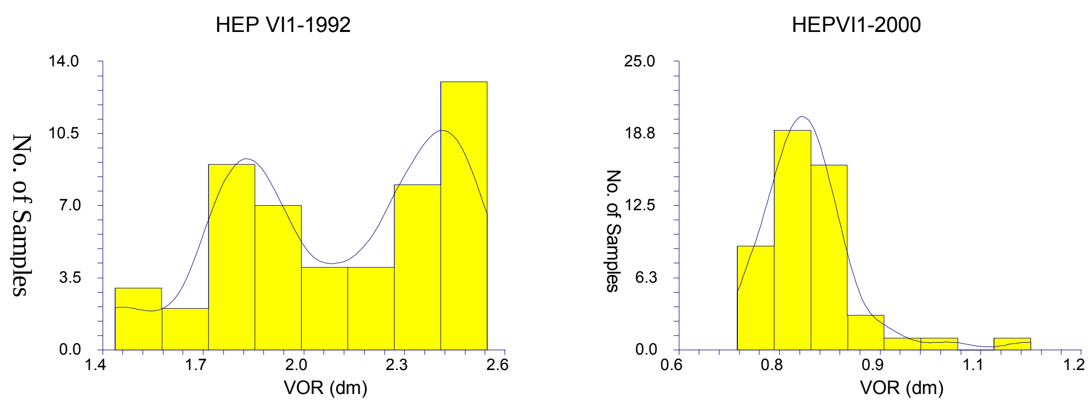



Figure 11. The number of samples per VOR and vegetation structure decrease from 1992 to 2000.

**Table 4. Power analyses for transect HEPVI1 statistical tests (n =50).**
**Equal-Variance T-Test Section**

| | **Hypothesis** | **Decision (5%)** | **Power** **Power** | | |
|---|---|---|---|---|---|
| | | | (Alpha = .05) | (Alpha = .01) | |
| | | $H_o$ | Reject | 1.000000 | 1.000000 |
| | $H_{A1}$ | | Accept | | 0.000000 |
| 0.000000 | | | | | |
| | $H_{A2}$ | | Reject | | 1.000000 |

1.000000

**Aspin-Welch Unequal-Variance Test Section**

| Hypothesis | Decision (5%) | Power (Alpha = .05) | Power (Alpha = .01) |
|---|---|---|---|
| $H_o$ | Reject | 1.000000 | 1.000000 |
| $H_{A1}$ | Reject | 0.000000 | 0.000000 |
| $H_{A2}$ | Accept | 1.000000 | 1.000000 |

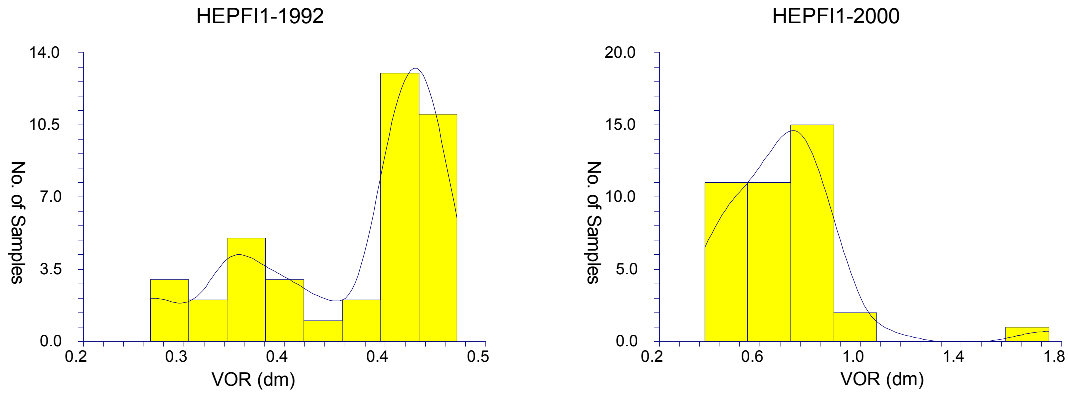



Figure 12. The number of samples per VOR and vegetation structure decrease from 1992 to 2000.

**Table 5. Power analyses for transect HEPFI1 statistical tests (n = 40).**

**Equal-Variance T-Test Section**

| Hypothesis | Decision (5%) | Power (Alpha = .05) | Power (Alpha = .01) |
|---|---|---|---|
| $H_o$ | Reject | 1.000000 | 1.000000 |
| $H_{A1}$ | Accept | 0.000000 | 0.000000 |
| $H_{A2}$ | Reject | 1.000000 | 1.000000 |

**Aspin-Welch Unequal-Variance Test Section**

| Hypothesis | Decision (5%) | Power (Alpha = .05) | Power (Alpha = .01) |
|---|---|---|---|
| $H_o$ | Reject | 1.000000 | 1.000000 |
| $H_{A1}$ | Reject | 0.000000 | 0.000000 |
| $H_{A2}$ | Accept | 1.000000 | 1.000000 |

Conclusion

Analysis of transect results indicate that grasslands comprised of non-native grasses need to be disturbed periodically (at approximately 5 year intervals) to maintain plant vigor, habitat structure, and diversity. Disturbance factors include controlled fire, raking, harrowing, mowing, and/or grazing. Other considerations include whether or not to reseed existing CPR and soil bank fields with native herbaceous cover, which may maintain habitat structure and plant vigor and diversity longer than non-native species (this option will be implemented at the SLWA in some areas). Although not reported in detail here, this analysis also examined percent forbs cover; percent grass cover, and percent cover/height of the shrub canopy. Without exception, percent cover forbs declined significantly between 1992 and 2000 in the grassland cover types. As stated in the Crab Creek Subbasin summary, the lack of quality shrubsteppe habitat comprised of a diverse array of grass and forbs species is a key limiting factor for both sharp-tailed and sage grouse.

Grassland Fertilizer Trial

A fertilizer trial was conducted to test the hypothesis that fertilizer can stimulate vegetative growth (structure), increase seed production, and improve nutrient cycling on restored grasslands.

Methods

Trial sites were selected and a baseline soil nutrient analysis was conducted. Six plots, three along one side of road and three on the other side of road, were established. Each side of road separated trial efforts; one side had recent history of sulfonated urea (SU) use, potentially retarding growth; and one didn't. (Also, as a bonus, the roadside "right-of-way" in between was considered almost "virgin" soil, and not nearly as depleted as the farmland soil). Control plots were also inserted within low and high fertilizer plots (tarps covered a small area while fertilizer was applied). All fertilizer was applied aerially.

Three treatments were applied:

1. Control (no treatment),
2. Low amount of fertilizer (N + S = 40 + 6)
3. High amount of fertilizer (N + S = 80 + 12)

<u>Results</u>

Compared to untreated surrounding restored grasslands, control plots showed no change. The following changes apply to both sides of the road on both SU and non-SU treated plots:

1. For low amounts of fertilizer, little change between control plots and surroundings.
2. For high amounts of fertilizer, there was very visible improvement in vegetative growth and in seed production as documented in Figure 13 and Figure 14. Aerial photos (Figure 15) show two "strips" crossing the road: very green "high fertilization" strip; and "low fertilization" strip, which is slightly greener than surrounding fields. Control plot does not visibly differ from surrounding fields. Soil nutrient analysis on one "high-fertilization" plot showed that nearly all applied fertilizer was taken up by plants in the growing season, as it was very similar to the baseline analysis.


Figure 13. Close-up view of fertilized versus non-fertilized trial results.


Figure 14. View of "tarped" non-fertilized control area within fertilized plot.

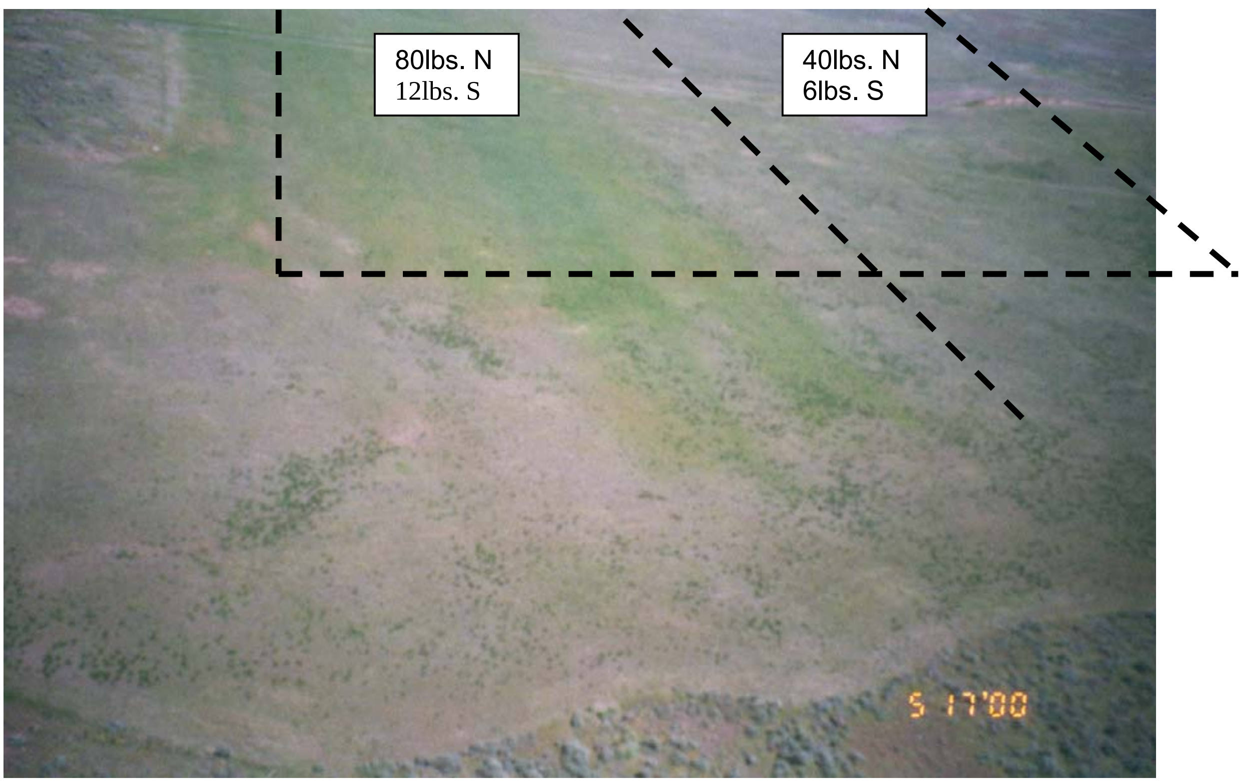



Figure 15. Comparison of fertilizer field trial results at the SLWA.

Conclusions

Under the conditions in spring 2000, it took a high amount of fertilizer to obtain a significant increase in vegetation growth and seed production (Figure 16). Comparison of baseline and post-fertilizer soil analyses show that plants did not take up all the applied sulfur, but did take up all applied nitrogen. This suggests that nitrogen may be the limiting factor in plant growth on restored grasslands at the SLWA. Continued monitoring of plots is needed for several years to determine how nitrogen and sulfur are taken up by plants and how nutrients cycle through the soil on restored fields.

Another fertilization trial will be conducted in March 2001just north of first trial. This will consist of four plots, and a control plot. Fertilization rates, in N + S:  50 + 7.5;  70 +10.5;  90 +13.5; and 70 + 0 will be applied in order to determine how much fertilizer is needed to produce significant plant growth and seed production increases. The plot without sulfur is to help determine whether or not sulfur significantly affects improvement.


Figure 16. Seed head production at different fertilizer rates (Sherman big bluegrass).

## Information Transfer and Sharing

All HEP, vegetation, field trial, wildlife survey, and adaptive management information will be disseminated electronically to CBFWA wildlife managers and BPA as soon as WDFW staff assembles final reports.  WDFW will also use pertinent research information/data provided by CBFWA members, universities, and non-government organizations to improve management of project lands and to ensure “best science” principles are employed.

**f. Proposal objectives, tasks and methods**

WDFW’s primary biological goal is to establish and maintain a viable sharp-tailed grouse population at the Swanson Lakes Wildlife Area.  Similarly, the primary biological objective is to increase the sharp-tailed grouse population to at least 400 grouse by 2010 through habitat manipulation, maintenance, and protection measures, and by local population recruitment and population augmentation if necessary. An important secondary goal is to protect, enhance, and maintain 8,094 ha (20,000 ac) of shrub-steppe habitat for sharp-tailed grouse and other shrub-steppe obligate species. SLWA mitigation project goals, objectives, strategies, and tasks are described below.

**Goal 1:**  Establish and maintain a viable sharp-tailed grouse population at the Swanson Lakes Wildlife Area.  This goal is consistent with the statewide goal to increase the population size and distribution of sharp-tailed grouse (WDFW 1995).  This goal is also consistent with the Crab Creek Subbasin goal to recover sharp-tailed grouse populations to viable levels within the subbasin.

**Objective 1:**  Conduct research on sharp-tailed grouse on the SLWA through 2005 in conjunction with WDFW’s statewide sharp-tailed grouse research program.

**Strategy 1:** Monitor population size, determine population viability, and evaluate population responses to habitat alteration.

**Task 1:** Monitor sharp-tailed grouse leks annually (lek surveillance).

**Task 2:** Search SLWA and adjacent areas for satellite/new leks annually (site reconnaissance).

**Task 3:** Conduct sharp-tailed grouse nesting and brood surveys annually (field surveys and/or radio telemetry).

**Task 4:** Correlate population responses to habitat alteration using statistical models including covariance analysis.

**Objective 2:** Increase the number of sharp-tailed grouse from approximately 180 (estimated number currently occupying SLWA [M. Schroeder, pers. comm. 1999) to 400 by 2010. This objective is consistent with the statewide objective to increase the breeding population of sharp-tailed grouse to more than 2,000 distributed throughout four management zones (SLWA is considered the 'core' property in WDFW's Sharp-tailed Grouse Management Zone 4). This objective also is consistent with the Crab Creek Subbasin objective to establish a population of at least 1,000 sharp-tailed grouse by 2010.

**Task 1:** Translocate sharp-tailed grouse to the SLWA for genetic augmentation purposes to improve long-term population viability (Augment the SLWA population with Columbian sharp-tailed grouse from southern Idaho, CCT Reservation, or other suitable population).

**Task 2:** Monitor and control recreational use of project lands (limit access to Lek and nesting sites in the spring; monitor hunters for evidence of incidental takings; maintain on-site reader boards, signs, and literature to educate the public of sharp-tailed grouse presence and status).

**Goal 2:** Protect, enhance, and maintain 8,094 ha (20,000 ac) of shrubsteppe habitat for sharp-tailed grouse and other shrubsteppe obligates. This goal is consistent with the statewide goal to protect, enhance, and increase shrubsteppe habitat (WDFW 2000).

**Objective 1:** Implement management activities and schedules described in the SLWA Enhancement Plan (Anderson, J. Ashley, P. R. 1993). This objective is consistent with the statewide objective to protect at least 98,000 acres of high quality, relatively contiguous (<2 mile gaps) habitat that is currently occupied (WDFW 1995). This objective also is consistent with the Crab Creek Subbasin objective to improve the quantity, quality, and configuration of shrubsteppe habitat necessary to support a viable population of sharp-tailed grouse by 2010.

**Task 1:** Control introduced vegetation (apply herbicides, use mechanical methods, and introduce biological agents i.e., insects).

**Task 2:** Maintain sharp-tailed grouse nesting and brood rearing habitat enhancements (re-seed as necessary, control weeds, monitor vegetation robustness/composition and manipulate habitat, if needed, based on adaptive management principles).

**Task 3:** Maintain shrub and tree enhancements (spot plant as necessary, control weeds, and monitor survival).

**Task 4:** Maintain 96 km (60 mi) of boundary fence to protect habitat from trespass livestock grazing and vehicle encroachment (project staff and Washington Conservation Corps (WCC) crews will accomplish this task).

**Task 5:** Maintain all project related equipment and machinery (project staff possess the skills required to maintain and/or overhaul equipment including large farming implements. The shop facilities and available tools are more than adequate to fulfill this task).

**Task 6:** Maintain project infrastructure and physical improvements including roads, signs, culverts, wells, buildings etc., to the extent necessary to implement the management plan (this task will be accomplished by project staff, WDFW engineers, and/or contractors as required).

**Task 7:** Coordinate protection, enhancement, and maintenance activities with BLM, DNR, adjacent landowners, and public interests (this task is on-going and includes public meetings and inter-agency coordination/ agreements).

**Task 8:** Provide adequate fire protection to include surveillance and fire fighting resources (fire control contract agreements are negotiated with local fire districts).

**Objective 2:** Monitor wildlife and habitat response to protection, maintenance, and enhancement measures annually[2]. This objective is consistent with the Crab Creek Subbasin objective to evaluate habitat restoration activities.

**Task 1:** Conduct surveys for sage grouse (site reconnaissance).

**Task 2:** Conduct annual neotropical bird surveys (point counts).

**Task 3:** Conduct big game (deer) surveys to estimate doe/fawn and doe/buck ratios and herd fecundity (site reconnaissance).

**Task 4:** Conduct hunter harvest surveys (bag checks).

**Task 5:** Monitor existing HEP and vegetation transects and establish new permanent vegetation transects (use HEP protocols, established vegetation measuring techniques and methods, and photo point documentation. WDFW Vegetation Management Team staff and mitigation biologists as appropriate will assist SLWA staff).

**Task 6:** Conduct HEP analysis and establish vegetation transects on new acquisitions/project lands (see task 5).

## Methods – Monitoring

Background (vegetation)

The following standardized vegetation/HEP monitoring protocols were developed for use at the SLWA and other WDFW mitigation project sites within appropriate cover types. As new information becomes available and/or monitoring needs change, the following protocols will be modified to meet the new challenges.

Monitoring is a tool for detecting change and identifying problems in the early stages before they become obvious or a crisis. If detected early, problems can be addressed while cost effective solutions are still available. For example, an invasive weed species is much easier to eradicate/control at the initial stages than attempting to eradicate it once established. Monitoring is also critical for measuring management success. Good monitoring can demonstrate that management strategies are working and provide evidence supporting the continuation of management. Conversely, monitoring can also show a need to change current management strategies.

Monitoring is a key component of "adaptive management," in which monitoring measures progress towards or away from meeting management goals and objectives and provides evidence to continue or change current management strategies (Ringold et al. 1996). In practice, most monitoring measures change or condition of the resource whether it is a plant community, or a wildlife species. If objectives are being met, management is considered effective.

[2] Sharp-tailed grouse surveys are listed under Goal 1, Objective 1. WDFW research/wildlife biologists will assist SLWA personnel monitor wildlife population responses.

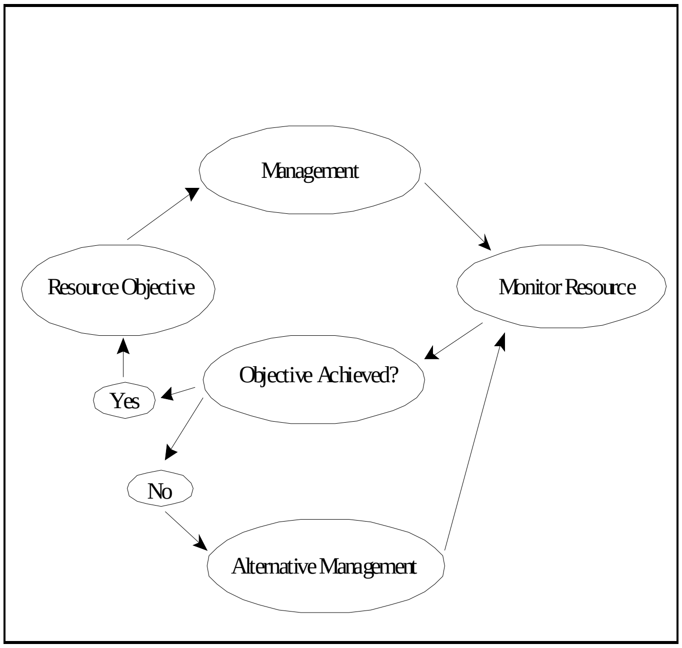



Figure 17. The adaptive management cycle.

The adaptive management cycle, illustrated in Figure 17, consists of four basic steps:

1. Resource objectives are developed to describe the desired condition.
2. Management is designed to meet the objectives, or existing management is continued.
3. The response of the resource is monitored to determine if the management objective has been met.
4. Management is adapted (changed) if objectives are not reached.

Monitoring, as part of the adaptive management cycle, has two primary components. The first is that monitoring is driven by management objectives. What is measured, how it is measured, and how often it is measured are defined by how an objective is described. The objective describes the desired condition. Management is designed to meet the objective. Monitoring is designed to determine if the objective is met. Objectives form the foundation of the project.

The second component is that monitoring is only initiated if opportunities for management change exist. If no alternative management options are available, expending resources to monitor something is almost futile. For example, since vegetation management (with exception of weed control measures) on shallow lithosols soils is impractical, it is not wise to use limited monitoring resources on these areas (this does not preclude general plant community inventories). In such cases, monitoring resources should be directed towards opportunities where management solutions are available.

Measuring change over time is the main characteristic of monitoring, but change can be measured as trend studies, baseline studies, long-term ecological studies, and inventories as well. Monitoring on WDFW Wildlife mitigation projects is tied to management objectives and includes plant community surveys similar to those conducted in conjunction with the baseline HEP analysis.

WDFW Wildlife Area staff, Vegetation Management Team personnel, and volunteers on a periodic basis will accomplish basic monitoring on mitigation lands (wildlife areas). M&E protocols and techniques are subject to change as new information becomes available. The following four monitoring surveys will be conducted:

1. HEP surveys (five year intervals)
2. General cover type/vegetation surveys (five year intervals)
3. Site specific enhancement and maintenance activity surveys (one to five year intervals)
4. Wildlife species response/trend surveys (one to three year intervals)

Monitoring falls under two general categories i.e., habitat monitoring and resource monitoring. Replicating HEP surveys is an example of habitat monitoring which describes how well an activity meets the objectives or management standards for a particular cover/habitat type. “Optimum” (1.0) habitat suitability for each HEP model variable is the standard against which the effectiveness of management is measured.

In contrast, resource monitoring focuses on vegetation and/or wildlife and describes some aspect such as height, percent cover, density, frequency, population characteristics, and/or species response. Both general cover type/vegetation surveys and monitoring of site specific enhancement and maintenance activities are examples of resource monitoring.

Wildlife area staff, WDFW wildlife biologists, and volunteers will conduct wildlife population and species response surveys. Monitoring includes both vegetation and wildlife resources.

Specific Monitoring and Evaluation Protocol

The primary concept behind establishing M&E transects is to detect change. Permanent transects are recommended over temporary transects because the statistical tests for detecting change from one period to the next in permanent sampling units are much more powerful than on temporary sampling units. This advantage usually translates into a reduction in the number of sampling units that need to be sampled to detect a given magnitude of change. The monitoring and evaluation protocols described below reflect the minimum monitoring necessary to ensure project goals and objectives are being met. These protocols, developed by Columbia Basin Fish and Wildlife Authority (CBFWA) members will be modified as new techniques are developed. Wildlife area staff and WDFW Vegetation Management Team members will collect additional plant community and wildlife population data as needed.

Habitat Evaluation Procedures Surveys

A minimum of 25 percent of the baseline HEP transects, located in areas not directly effected by enhancements or maintenance activities, will be replicated by wildlife area staff every five years to monitor general habitat trends. At least two baseline transects will be replicated in each cover type. Evaluators will use the same measurement techniques/instruments described within specific HEP models or used on baseline HEP transects to measure habitat variables. In general, HEP transects in shrub-steppe, riparian, and forested habitats are established as follows:

Transect starting points and azimuths (direction) are randomly selected for each cover type and recorded on data sheets along with transect identification, cover type, HEP Team, and global positioning system (GPS) information. If possible, transects are established at least 100 meters from ecotones, roads, and other anthropogenic influences.

Transect start and end points are marked with a 36 centimeter (14-inch) long 0.6 centimeter (¼ inch) rebar stake painted fluorescent orange or red. GPS positions are also taken at both start and end points. If cover types change, either another transect azimuth is randomly selected, or the original azimuth is varied by 45 degrees. The method selected is based on which technique maintains the transect within the cover type. Compass azimuths (headings) are corrected for local declination.

Shrubland transects are divided into 30 meter (100 foot) sampling units. Similarly, grassland transects are also divided into 30 meter (100 foot) sampling units (n).

The process for determining transect length (sample size) varies based on what variable was being measured. In general, a “running mean” is used to estimate variance on cover pole readings (95% probability of being within ± 10 percent of the true mean). On the other hand, shrub cover sample size is estimated by first tallying total shrub cover within each 100 foot sampling unit and dividing that sum by sample unit length to obtain percent shrub cover per sample unit (i.e., 10 feet of cover/100 feet = 10 percent shrub cover). The standard deviation is then calculated from the percent shrub cover data for each sample unit. The sample size is determined through use of the following equation:

$$n = \frac{t^2 s^2}{B^2}$$

where: *t* = t value at the 95 percent (0.05) confidence interval for the appropriate degrees of freedom (*df*); *s* = standard deviation; and *B* = bounds (± 10 percent). The same equation is used to determine sample size for plot frames based on total percent cover for herbaceous species.

Specific transect establishment protocols are described below. Additional information can be found in <u>Estimating Wildlife Habitat Variables</u> (USFWS 1981).

1. Establish transect starting point 300 feet within cover type (if possible). Record shrub intercept in 10ths of feet by shrub species for each sampling unit (100 foot segments) for entire transect length. Using a graduated rod, measure shrub height (10ths of feet) at the highest point where shrub foliage/stems intercept transect line.

2. Facing line of travel (transect azimuth), walk on left side of transect line to avoid trampling vegetation on both sides of transect. Place first rectangular plot frame at the 25 foot mark and at 25 foot intervals thereafter (four per 100 foot sampling unit). Place the lower right hand corner of the plot frame on the 25 foot interval mark on the right side of the transect line with the long axis of the plot frame perpendicular to the transect line of travel. Make ocular estimates of: herbaceous cover by plant species, percent of plot comprised of total herbaceous cover, and percent of herbaceous cover composed of grass as described by Daubenmire (1970).

3. Measure height of herbaceous cover by species in each plot frame with a graduated rod/tape measure (10ths of feet).

4. Take two Robel pole measurements per sampling unit i.e., one at the 50 foot mark and the other at the 100 foot interval. Four observations are taken and averaged per point to obtain a single visual obstruction reading or VOR (two measurements are taken four meters from the point on the transect line on opposite sides of the cover pole from a height of one meter; two measurements are taken from the point perpendicular to the transect line of travel).

HEP surveys will be conducted within the same general time frame and location as the original baseline transects to ensure results are comparable (the phonological state of key plants are noted on baseline transects and are subsequently used to initiate follow-up transects rather than specific calendar dates). Photo points will be re-photographed and/or established as needed. If time/funding constraints allow, more detailed plant community inventories will be conducted concurrent with collection of HEP variable information.

General Vegetation Monitoring - Shrubland/Grassland Cover Types

Vegetation sampling on shrub-steppe plant communities will focus on detecting changes in frequency of bluebunch wheatgrass, needle-and-thread grass, Idaho fescue, cheatgrass, and knapweed. Bluebunch wheatgrass, needle-and-thread, and Idaho fescue are native perennial bunchgrasses that are highly susceptible to grazing pressure and competition from non-native plant species. As a result, these species are good indicators of general habitat quality.[3]

Likewise, cheatgrass, mustards, Russian thistle, and knapweed are indicators of past/present disturbance. Frequency/percent cover of sagebrush spp. and bitterbrush will also be monitored to assess shrubland habitat quality/trends[4] (evaluators should review HEP transect results and/or confer with Vegetation Management Team members prior to modifying the species recommended for frequency monitoring) The rationale for using frequency is explained below.

Percent frequency was selected as the monitoring technique because it is appropriate for any plant species' growth form. It is appropriate for monitoring some annuals, whose density may vary year to year, but whose spatial arrangement of germination remains fairly stable such as cheatgrass. Rhizomatous species, especially graminoid species growing with similar vegetation, are often measured by frequency because there is no need to define a sampling unit such as percent cover or density. Frequency is also a good measure for monitoring invasions of undesirable species as well as increases/decreases in desirable species..

Another advantage of frequency methods over methods for measuring cover is the longer time window for sampling. Once plants have germinated, frequency measurements are fairly stable throughout the growing season as compared to cover measurements which can change considerably from week to week as plants grow. The biggest advantage of frequency methods, however, is that the only decision required by the observer is whether or not a species occurs within the plot. Technicians can be easily taught to measure frequency with minimal training on methodology and species identification. If the species is easy to recognize, frequency plots can be evaluated quickly.

Frequency data only provides information on the number of individuals, or the change in that number relative to the size of the plot frame or its subsections. It is a good methodology to determine if a site has more or less plants of a specific species; however, it does not provide other information that may be useful for habitat or plant community characterization (C. Perry, pers. comm. 2000)

Both spatial distribution and the density of the population also affect frequency Greig- Smith 1983). Because of this it is difficult to interpret changes biologically since it is not known if a change is due to density, distribution, or both. As a result, frequency data will be augmented with abundance and density information.

Frequency is a measure dependant upon plot size and shape. Plot size should be such that plants being measured fall between the 20 percent to 80 percent range (Perry, pers. com.). Therefore, the plots used to determine frequency must be identical to compare different studies. Herbaceous cover and frequency data, collected during the HEP baseline analysis, was obtained using the same 0 .5 meter$^2$ rectangular microplot as recommended for use in this M&E protocol. Frequency data from baseline transects can be used, rather than a pilot study, to estimate M&E transect sample size.

[3]It is assumed that if bluebunch wheatgrass and needle and thread bunchgrasses are well represented within the plant community, general habitat quality and vegetation diversity is good.
[4]Grass and shrub species recommendations provided by WDFW Vegetation Management Team member Chuck Perry on May 2, 2000.

Transect Procedures
A minimum of two transects will be established for each cover type. Transect locations/start points will be determined using standard procedures (this can be accomplished as a pre-field activity). Transects will be established at least 100 meters from the edge of the cover type and away from roads and other anthropogenic factors (unless the disturbed area is the target site) as follows:

1. Select a random azimuth (direction) from a random numbers table or other suitable device/technique. Stretch and secure a 100-meter tape along the random azimuth to establish the 100-meter baseline transect (document compass azimuth and declination on transect data sheets).

2. Document the location of baseline transects with Global Positioning System (GPS) equipment and plot on field maps (record GPS coordinates and other pertinent location information on transect forms).

3. Establish ten perpendicular transects (90 degrees off baseline), 30 meters in length, along the baseline transect (record azimuth on data forms). The location of the first perpendicular transect is selected at random and placed between 0-10 meters from the start point (0 meter mark). Place the following transects systematically at ten-meter intervals. For example, if the first perpendicular transect is positioned at the 5 meter mark, the second transect is placed at the 15 meter mark, the third at the 25 meter mark and so on until 10 perpendicular transects are established. Permanently mark the start and end points of the baseline and perpendicular transects.

4. Position ten microplots (0.5 meter$^2$ rectangular microplot) systematically along each perpendicular transect from a random start point. The placement of microplots is determined by selecting a random number between 0 and 3 (the first data collection point for the transect). Starting at the first data collection point, place the microplot at 3 meter intervals along the perpendicular transect until 10 microplot measurements are taken. For example, if the first data point is 2 meters, the second data point is at 5 meters, the third at 8 meters and so forth (10 perpendicular transects x 10 microplots = 100 per survey).

5. Photo-document transects. Take three photographs per transect from transect start point. Position the camera one meter above the ground (use one meter cover board or similar device for camera rest); set 1.5 meter cover board on 10-meter mark of baseline transect along with transect photo board and photograph. Repeat procedure half way between the baseline and first perpendicular transect (45 degrees off baseline). Take the third picture along the first perpendicular transect using the same procedure. Record camera type, aperture, distance and azimuth to cover board, cover board dimensions, date, time of day, transect/location identification, GPS coordinates, and photographer (cover boards will be supplied by WDFW mitigation staff).

6. Facing towards the end point of the perpendicular transect, data recorders walk on the left side of the transect line, to avoid trampling vegetation, and take measurements on the right side of the transect line. The long axis of the microplot is placed perpendicular to the transect azimuth with the lower right hand corner of the microplot at the data collection point. This procedure is repeated for each perpendicular transect. If possible, microplot data points should be permanently marked. Transect layout is illustrated in Figure 18 while microplot placement and shrub intercept “point” count intervals are shown in Figure 19.

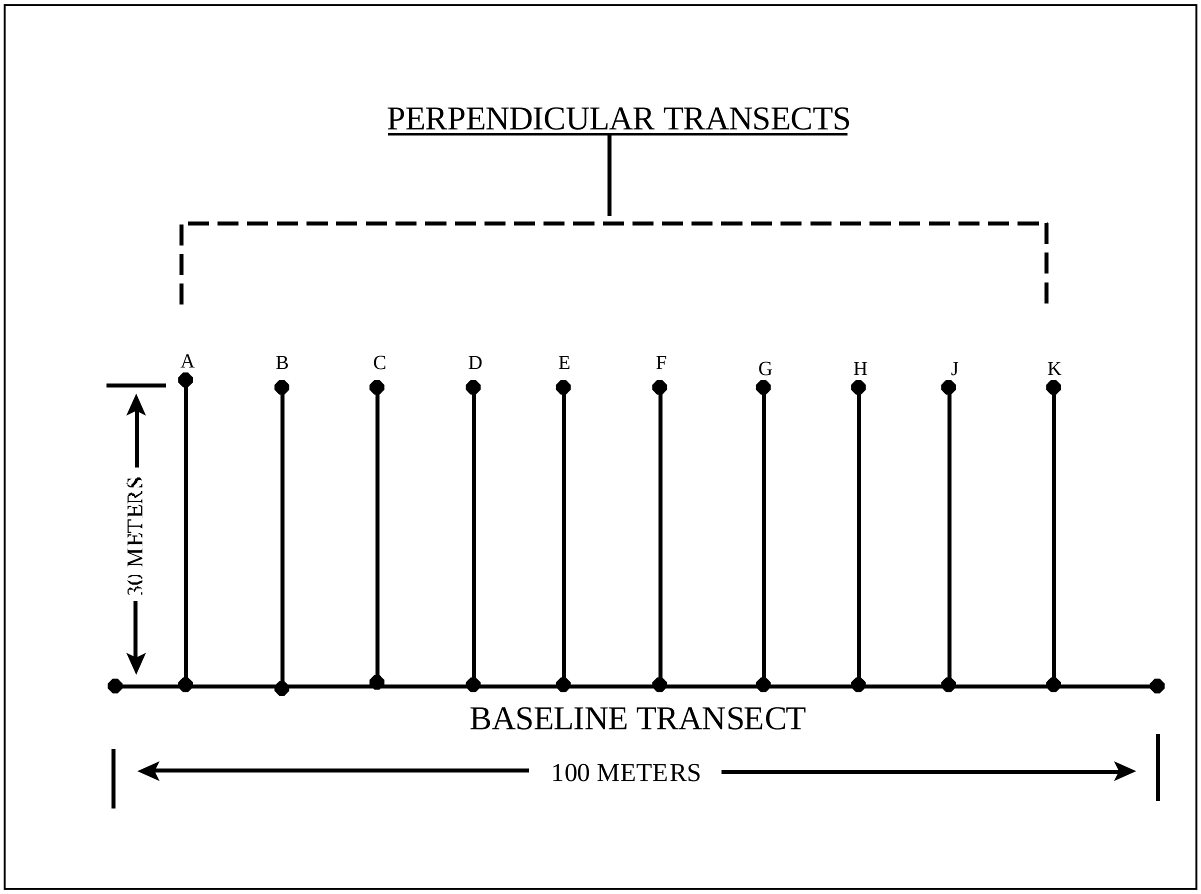

PERPENDICULAR TRANSECTS
A
B
C
D
E
F
G
H
J
K
30 METERS
BASELINE TRANSECT
100 METERS

Figure 18.

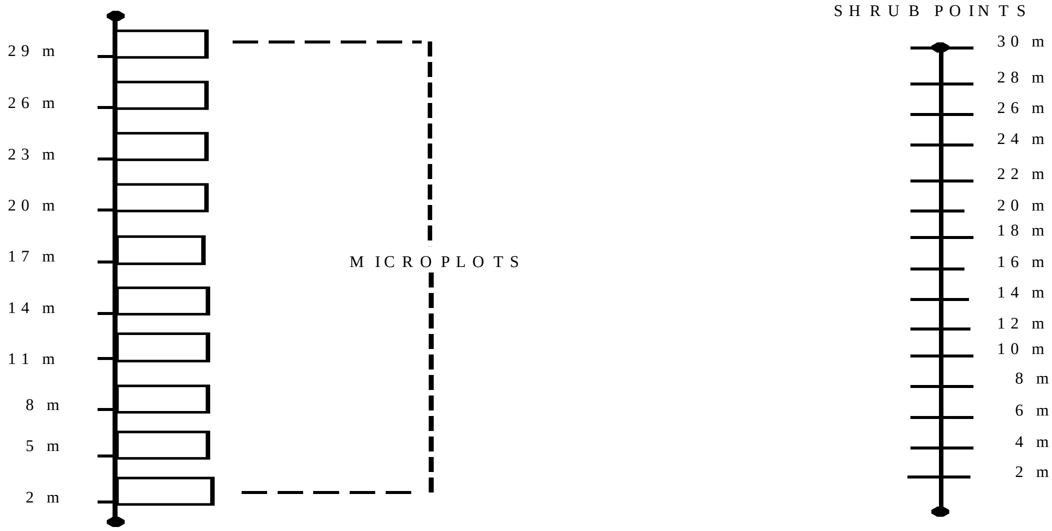



Figure 19. Microplot and shrub “point” placement on perpendicular transects (not to scale).

Herbaceous vegetation frequency, abundance, and density measures are collected using a 0 .5m $^2$ rectangular microplot as the sampling unit. The microplot is divided into 20 percent increments to facilitate collection of abundance and percent cover data (Figure 20). Frequency is determined by simply noting whether or not a given species is rooted within the microplot. For example, if 100 microplots are laid out and species “A” occurs in 25 of the plots, frequency is 25 percent.

Abundance, ranging from one to five, is the number of 20 percent increments within a microplot a species is rooted in. Figure 21 illustrates an example of an abundance factor of three (count the number of 20 percent increments a species is rooted in, not the number of individual plants).

Density, in contrast, is the number of individuals of a given species rooted within the entire microplot. Density is divided into 5 classes: **Class 1** - 1 to 5 individuals, **Class 2** - 6 to 10 individuals, **Class 3** - 11 to 15 individuals, **Class 4** - 16 to 20 individuals, **Class 5** - above 20 individual plants. Classes may be adjusted based on target species growth form i.e., if the plant species of interest is very small, 20 individuals may not be significant (always document changes to protocols). Density measurements are most sensitive to changes caused by mortality or recruitment. Figure 22 depicts a microplot with a density factor of three.

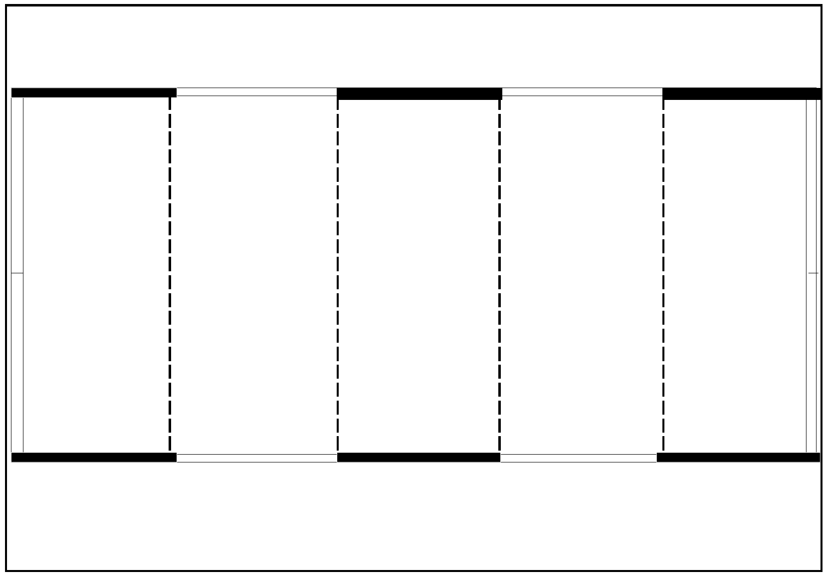


Figure20.  A microplot divided into 20 percent increments.

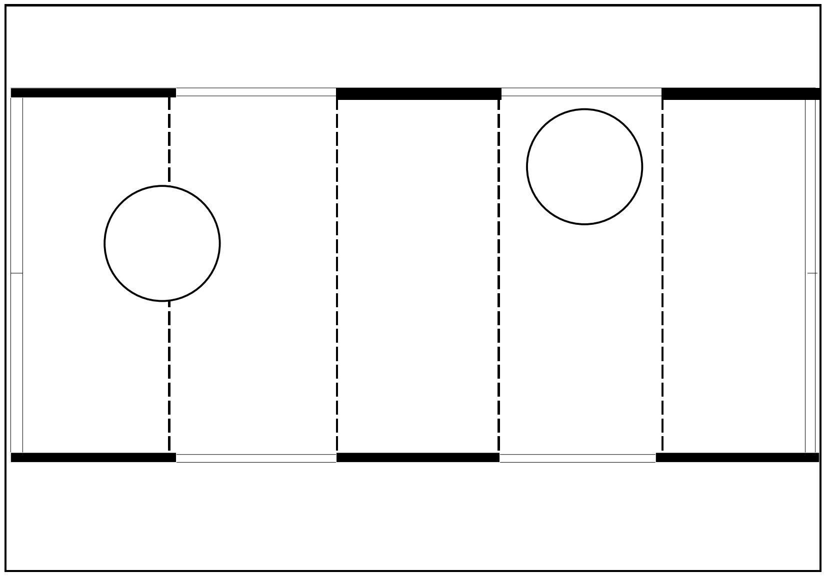


Figure 21. A microplot with an abundance factor of three (plants are rooted in three segments

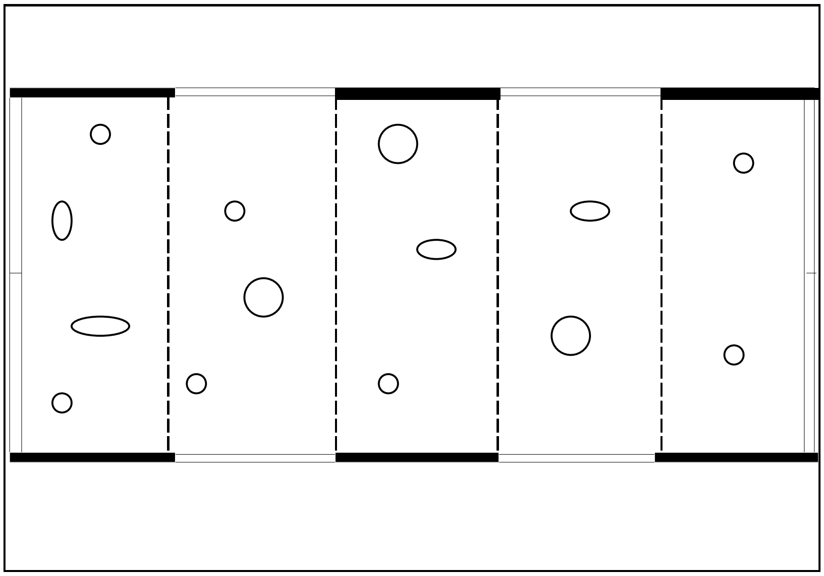


Figure 22. A microplot with a density class of three (11 to 15 plants per microplot).

Whether measuring frequency, abundance, or density, plants that are partially rooted both in and outside of the microplot are counted in and out alternately along the boundary i.e., count every other plant. Plant community inventories will be conducted on at least one transect per cover type in conjunction with the M&E microplot surveys if time and funding is available. In addition to frequency, abundance, and density information, plant inventory data includes species composition, height, and percent cover for each microplot.

Shrub data collected on each perpendicular transect includes: species, frequency, percent cover, height, and age. Shrub frequency and cover are determined using “point” counts at two meter intervals (systematically) starting at the 2 meter mark on each transect (15 points per transect, or 150 total). The line intercept method is an alternative technique for collecting percent cover for shrubs (this technique will add to the time required to complete each transect, but is hard to beat).

Shrub height is measured at the highest vertical projection a shrub extends directly above the data point. Shrub age classes are broken down into 5 categories: **Young**-non flowering/seed bearing (includes seedlings), **Mature**-generally flowering and/or seed bearing, less than 25% of the plant is dead, **Decadent**- 25-50% is dead material, **Very Decadent**- more than 50% is dead, **Dead**-no living material remains on the shrub.

General Vegetation Monitoring - Forest and Riparian Cover types

Forest and riparian cover type transects are established as previously described under HEP protocols. Snag and/or tree basal area information is collected from within 0.04 ha (0.10 ac) circular plots located at 30 meter (100 foot) intervals along each transect. Tree canopy cover is determined using a densitometer (similar to a moose horn) at 3 meter (10 foot) intervals (10 per 30 meter/100 foot sampling unit; 100 per 300 meter/1,000 foot transect). Diameter breast height (DBH) measurements are taken on forest and riparian forest transects if needed. Due to the linear juxtaposition of most riparian forest areas, 300 meter (1000 foot) line intercept transects will be established for monitoring purposes. Baseline HEP transects may be replicated instead of establishing new transects. M&E will occur at five year intervals, or earlier if required. At least one M&E transect will be established in riparian, riparian forest, and forest cover types and a minimum of two M&E transects will occur on xeric forested sites in each management unit.

In forest and riparian cover types the following habitat attributes will be documented/measured:

1. Tree stratum: species, percent canopy cover, mean height, number snags 4 inches DBH, mean DBH, basal area, and stems per acre/hectare (on treated sites).
2. Shrub stratum: species, percent cover, and mean height
3. Herbaceous stratum: dominant grass, forb, and weed species, frequency, abundance, density, and/or percent cover.

Transect procedures

1. Establish random 300 meter (1,000 foot) baseline transects within cover type (ten 30 meter/100 foot sampling units).
A. Measure tree canopy cover at 3 meter (10 foot) increments along transect (identify species).
B. Measure tree height of over-story canopy at 30 meter (100 foot) intervals.
C. Take herbaceous vegetation measurements at 7.5 meter (25 foot) intervals with microplot.
D. Measure/estimate shrub intercept, height, and age class by species.

2. Establish ten one tenth acre (0.04 hectare) circular plots[5] at 30 meter (100 foot) intervals (Figure 23).
A. Count the number of snags ≥ 10 cm (4 in) DBH.
B. Measure DBH (identify species)
C. Measure basal area
D. Count the number of tree stems per plot on treated sites

Photo-document transects from transect start point. Photograph along baseline transect as described for shrubland and grassland transects. If vegetation is too dense, photograph from a point perpendicular to the transect. Mark location with a permanent monument and describe and record GPS coordinates.

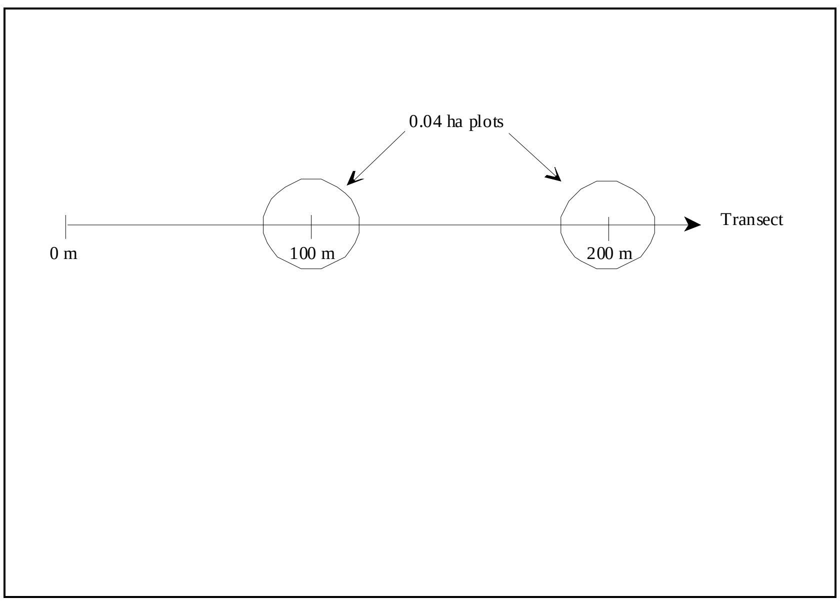



Figure 23. Forest and riparian cover type transect layout

Site Specific Enhancement and Maintenance Activity Monitoring

Enhancement and operation and maintenance activities are monitored to ensure that management strategies are accomplishing project objectives. If necessary, adaptive management strategies will be implemented to modify existing enhancement/O&M activities to meet specific objectives.

[5]Approximately a 37 foot radius.

Evaluators will follow procedures described in previous sections to establish monitoring transects in shrubland, grassland, forest, and riparian cover types. Two monitoring transects will be established at each grassland/shrubland enhancement site more than 81 ha (200 ac) in size (if less than 81 ha, only one monitoring site will be established). A minimum of one monitoring transect will be established in enhanced forest and riparian areas. Roadside weed control projects will be monitored using linear transects with microplots set at three-meter intervals (a minimum of two transects per management unit).

Enhanced grassland/shrubland cover type vegetation will be monitored at five-year intervals. Roadside weed control projects will be monitored at two-year intervals. Weed control monitoring will involve monitoring both desirable and undesirable species. For example, if an area has diffuse knapweed and the objective is to reduce this and develop a higher quality native plant community, evaluators would monitor both the decline of the knapweed and the increase of a desirable species such as bluebunch wheatgrass (Perry, pers. com. 2000).

Pre-enhancement/maintenance photo-documentation and vegetation surveys will occur where possible. Enhancement/maintenance activity results will be photographed one year after enhancement/maintenance activities are implemented and every two years thereafter (after five years, photographs will be taken at five year intervals for the life of the project).

Vegetation Monitoring/Sampling Objectives

As previously stated, monitoring objectives are linked to management objectives. M&E focuses on detecting change and determining habitat trends. The following examples illustrate how management objectives, monitoring/sampling objectives, and management response are inter-related to form a comprehensive management plan. Wildlife managers may modify these examples to fit specific needs and will develop similar objectives as part of general M&E protocols. Habitat variables and suggested measurement techniques are described on Table 6.

<u>Example 1</u>:
Management Objective: Decrease percent frequency of diffuse knapweed by 50 percent along field roads throughout the project site by the end of FY 2005.

Sampling Objective: Be 90% certain of detecting a 20% change in frequency of diffuse knapweed with a false change rate of 0.10.

Management Response: If diffuse knapweed frequency fails to decrease, additional research of potential management options will be initiated and adaptive management strategies will be implemented by end of FY 2006.

<u>Example 2</u>:
Management Objective: Maintain mean frequency of bluebunch wheatgrass within the shrubland cover type on the Roloff Unit within 20% of the 1999 mean frequency (85%) between FY 2000 and FY 2005.

Sampling Objective: Be 95% certain of detecting a 20% change in frequency of bluebunch wheatgrass with a false change rate of 0.10.

Management Response: Failure to maintain the minimum frequency will trigger a study examining interactions between “rest” and “disturbance” management regimens, climatic factors, and deer/herbivore grazing in the area; with alternative management measures implemented within four years after the first year the unacceptable level of decline is measured.

<u>Example 3</u>:
Management Objective: Increase mean stem density and percent cover of quaking aspen and water birch trees by 30% within ephemeral and permanent wetlands on the Roloff Unit by end of FY 2008.

Sampling Objective: 90% certain of detecting a 20% change in stem density and percent cover of aspen and cottonwood trees with a false change rate of 0.10.

Management Response: Failure to meet the objective will result in more intensive monitoring to determine the cause of the failure, and implementation of adaptive management by end of FY 2010

<u>Example 4</u>:
Management Objective Restore 80 acres of abandoned cropland to native like shrub-steppe habitat on the Finch Unit by the end of FY 2003.

Sampling Objective: Establish pre and post photo plots and photo-document at target years 0, 1, 3, 5, 10. Conduct pre and post planting surveys at target years 0, 1, 5, 10. Conduct weed surveys annually.

Management Response Reseed and control weeds as necessary on an annual basis.

Table 6. Habitat variable measurement techniques for HEP surveys and vegetation monitoring transects.

| Variable | Measurement Technique |
|---|---|
| Percent sagebrush cover (mean) | Line intercept |
| Mean sagebrush height | Graduated rod/tape measure |
| Shrub species | Ocular identification |
| Topography/topographic diversity | Topographic map/GIS map |
| Aspect | Compass/topographic map |
| Size of wintering area | Aerial photograph/GIS map |
| Percent grass cover (includes residual vegetation) | ½ square meter rectangle plot frame (0.5x1.0 meter) |
| Percent forb cover (includes residual vegetation) | ½ square meter rectangle plot frame (0.5x1.0 meter) |
| Mean height herbaceous/residual vegetation | Tape measure |
| Percent shrub cover (mean) | Line intercept |
| Mean shrub height | Graduated rod/tape measure |
| Percent slope | Clinometer/topographic map |
| Visual obstruction reading (VOR) for general area | Robel pole (Robel et al.) |
| Percent of area with VOR $\geq$2 decimeters | Robel pole |
| Percent herbaceous plant cover | ½ square meter rectangle plot frame (0.5x1.0 meter) |
| Percent herbaceous cover composed of grass | ½ square meter rectangle plot frame (0.5x1.0 meter) |
| Distance to perch sites | Estimated/tape measure |
| Percent cover preferred/all shrubs $\leq$1.5 meters | Line intercept |
| Number of preferred shrub species | Line intercept/direct count |
| Presence of agricultural crops | Aerial photographs/direct observation |
| Road density | Topographic/county maps |
| Percent evergreen canopy $\geq$1.5 meters in height | Line intercept |

Vegetation Monitoring Statistics

Background

The following paragraphs are intended to provide a cursory review of the statistical concepts needed to analyze M&E data. The references and computer software/shareware programs listed at the end of this section provide detailed statistical theory and/or can be used to determine sample size and interpret data.

If management objectives require detecting change from one period to another in some average value such as a mean or proportion, then statistical analysis consists of a significance test, also called a hypothesis test. This situation occurs in monitoring and involves analysis of two or more samples from the same monitoring site at different times (generally two or more years of data), (BLM 1998).

The primary question asked is whether or not there has been a true change in the parameter of interest over a particular period of time. In other words, significance tests are used to assess the probability of an observed difference being real or the result of the random variation that comes from taking different samples to estimate the parameter of interest. The parameters of interest are usually means and proportions.

A hypothesis is a prerequisite to the use of a significance test. In monitoring, this hypothesis is usually that no change has occurred in the parameter of interest. The “no change” hypothesis is known as the “null” hypothesis ($H_O$). If after applying a significance test the conclusion is that the observed change in a parameter between two or more years is not likely do to stochastic variation, then the null hypothesis is rejected in favor of an alternative hypothesis ($H_A$) i.e., that there has been a change in the parameter of interest (if change is detected it also important to note the direction of change).

To test the null hypothesis the difference between the two sample means must be quantified with a “test statistic” (Glantz 1992). When the test statistic is sufficiently large, the null hypothesis of no difference between population means is rejected. Evaluators specify, in advance, how large the test statistic must be in order to reject or accept the null hypothesis by specifying a critical or threshold significance level (*P* value).

The *P* value is the probability of obtaining a value of the test statistic as large or larger than the *P* value computed for the data when in reality there is no difference between the two populations. For example, if through the analysis a *P* value of 0.18 is derived and the chosen test statistic threshold value is 0.20, then we conclude that the true population mean has changed. There is an 18% chance that the conclusion is wrong (that no true change has occurred and that a false change error has been committed). In contrast, if the *P* value from the analysis were 0.85, we would conclude the true population mean has not changed, because the calculated value is larger than the threshold *P* value of 0.20 (there is a possibility that a missed change error has occurred). Actual data analysis *P* values should be reported (instead of reporting: $P < 0.20$, report $P = 0.18$).

It is recommended that evaluators use a *P* value of 0.10 or 0.05 for threshold values in this M&E program (evaluators will consult with Vegetation Management Team members before changing the recommendations). Furthermore, evaluators will document the rationale for selecting *P* values other than 0.10 or 0.05.

Statistical Tests

Significance tests used to analyze data for the differences between the means and proportions of two or more samples are listed on Table 7. Means include measures such as percent cover, density, and height while proportions refer primarily to frequency measurements. The tests listed in Table 7 are not all inclusive. If used as recommended, however, data analysis will be standardized and consistent between mitigation projects.

Table 7. Significance tests/recommendations for monitoring and evaluation data analysis.

| Significance Test | Analyzes: | | Used to Analyze: | Recommended for use: |
|---|---|---|---|---|
| | Means | Proportions | | |
| One-tailed *t* test | Yes | No | Independent samples | Limited |
| Two sample *t* test | Yes | No | Independent samples | Yes |
| Paired *t* test | Yes | No | Paired samples | Yes |
| Analysis of variance[6] | Yes | No | Independent samples | Limited |
| Chi-square test | No | Yes | Independent samples | Yes |
| McNemar's test | No | Yes | Paired samples | Yes |

Statistical software packages to determine sample size and conduct significance tests are commercially available (Pass 2000, NCSS, Statistix etc.), or through shareware programs such as "STPLAN" at http://odin.mdacc.tmc.edu/ (click on "Free computer code from the Section of Computer Science," click on "Software" then go to "STPLAN" and follow instructions). In addition, both Microsoft and Corel spreadsheets include significance test programs.

Two excellent hard copy publications that are readily available are BLM Technical Reference 1730-1, Measuring and Monitoring Plant Populations (copies available from: BLM National Business Center, BC-650B, P.O. Box 25047, Denver, Colorado 80225-0047), and Biostatistical Analysis, 4th edition by J.H. Zar (published by Prentice Hall available through most book stores).

Monitoring (Wildlife)

Wildlife monitoring efforts at the SLWA are dominated by sharp-tailed grouse lek monitoring and shrubsteppe bird surveys. Although hunter bag checks, big game and waterfowl surveys are conducted, the following paragraphs will expand only upon sharp-tailed grouse and shrub-steppe bird surveys. Do to the sensitive nature of lek locations, a lek map is not been included in this proposal but is available to ISRP members on request.

Sharp-tailed Grouse
The abundance and distribution of Columbian sharp-tailed grouse have clearly declined within the state of Washington (Yocom 1952; Buss and Dziedzic 1955; Hays et al. 1998; Schroeder et al. 2000). In 1998, these declines lead to the state listing of the Columbian sharp-tailed grouse as a threatened species in Washington (Hays et al. 1998). The long-term decline in the status of sharp-tailed grouse has been attributed to the dramatic alteration of native habitat due to cultivation and degradation (Buss and Dziedzic 1955; McDonald and Reese 1998). The native habitats include grass-dominated nesting habitat and deciduous shrub-dominated wintering habitat, both of which are critical for sharp-tailed grouse (Giesen and Connelly 1993; Connelly et al. 1998).

Most of the leks that were surveyed between 1954 and 1969, including those on and near what is now the SLWA, were relatively large and opportunistically visited by members of bird-watching organizations and personnel of the Washington Department of Fish and Wildlife (Department of Game at that time). Surveys of leks prior to 1970 typically consisted of a single count of the birds attending a lek during the breeding season and they did not represent a standardized effort. The Washington Department of Fish and Wildlife and the Colville Confederated Tribes expanded the surveys between 1970 and 1989, including additional searches for new and/or previously undiscovered leks and multiple ( 2) visits to specific leks. Between 1990 and 2000 personnel of the Washington Department of Fish and Wildlife, The Colville Confederated Tribes, and The Nature Conservancy attempted to visit all sharp-tailed grouse leks in Washington on 2 occasions.

Attendance numbers for lek complexes were analyzed by using the highest number of birds observed on a single day for each lek complex for each year. Average attendance at all lek complexes was used as a method to evaluate annual population change and to provide a technique for comparing populations of sharp-tailed grouse in Washington with populations in other regions (Connelly et al. 1998). Rates of population change were analyzed by comparing the total number of birds counted at all lek complexes counted in consecutive years; or in 2 cases in the 1960s, 2 year intervals. Because sampling was occasionally biased by size and accessibility of lek complexes, lek complexes not counted in consecutive years or on both

6 Analysis of variance (ANOVA) is used when three or more years of data is analyzed.

ends of a specific 2 year interval were excluded from the sample for that specific interval. Annual rates of population change were then used to estimate annual spring populations backward between 2000 and 1960. The 2000 initial population was estimated by multiplying lek attendance numbers for each lek complex by 2; this technique assumes that lek counts include mostly males and that the male:female sex ratio is approximately 1:1 (Hays et al. 1998).

The average maximum count of birds on lek complexes was 9.9 for 744 annual counts between 1960 and 2000. Counts on lek complexes averaged 9.3 for 21 leks in 2000. Average attendance at lek complexes between 1960 and 1999 tended to decline at an annual rate of 1.4%. The 2000 population estimate was 585: 350 at Nespelem; 188 at Swanson Lakes; 60 at Dyre Hill; and 106 in the Okanogan River areas (Tunk Valley, Greenaway Spring, Chesaw, Horse Springs Coulee, and Scotch Creek). Lek counts at SLWA are described on Table 8.

Table 8. Swanson Lakes Wildlife Area sharp-tailed grouse lek count results from 1992 to 2000.

| | Year/Number of Grouse | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Lek | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | Total |
| Powerline | 4 | 3 | 3 | 9 | 2 | 2 | 0 | 0 | 0 | 23 |
| Swanson | 14 | 17 | 11 | 9 | 8 | 6 | 5 | 14 | 8 | 92 |
| Phantom | N/A[7] | 16 | 15 | 22 | 18 | 11 | 12 | 12 | 12 | 118 |
| 7 Springs | 2 | 2 | N/A | 16 | 13 | 10 | 8 | 10 | 6 | 67 |
| Tracy | 3 | 3 | 0 | 0 | 4 | 5 | 2 | 6 | 4 | 27 |
| Anderson | 0 | 0 | 1 | N/A | 1 | 13 | 9 | 15 | 14 | 53 |
| Roseman | 1 | N/A | N/A | 6 | 9 | N/A | 7 | 0 | 2 | 25 |
| BLM[8] | N/A | N/A | N/A | N/A | N/A | 10 | 5 | 5 | 3 | 23 |
| Total | 24 | 41 | 30 | 62 | 55 | 57 | 48 | 62 | 49 | 428 |

The total number of Columbian sharp-tailed grouse in Washington was estimated to be 585 in 2000, consisting of eight relatively distinct populations. The distribution of sharp-tailed grouse declined about 97% from historic levels and the overall abundance declined about 94% since 1960; declines in the remaining populations also have been dramatic (73 - 96% since 1970).

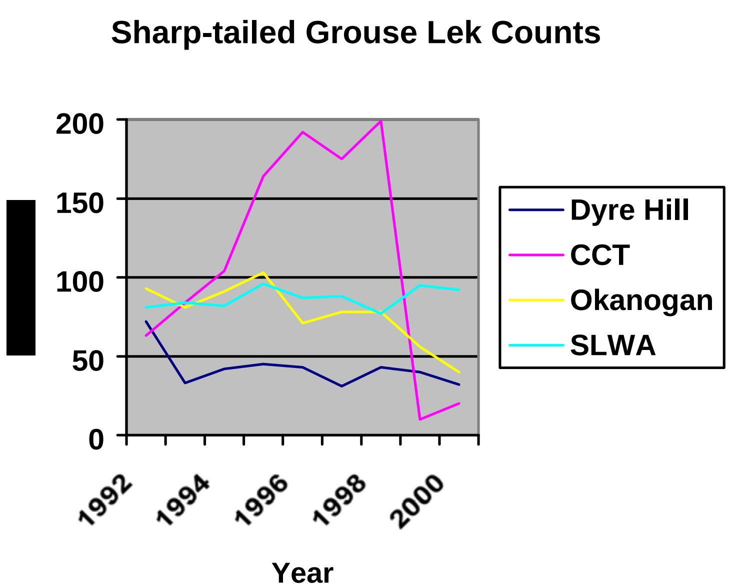



Figure 24. Lek survey counts for four sharp-tailed grouse populations.

[7] Indicates Leks not surveyed that year.
[8] BLM Lek established in 1997.

Lek survey counts for four sharp-tailed populations in northeast Washington are compared in Figure 24. The population decline on the CCT Reservation in 1999 is due to incomplete data for that year. Lek counts at the SLWA include off project lek sites occurring within 3.2 km (2 mi) of project boundaries. Declines in sharp-tailed grouse at the Powerline lek (Table 8) are likely the result of grouse moving to an adjacent off site lek. This is probably true for other leks such as the BLM lek. Although lek counts are declining slightly at the SLWA, the overall population appears stable in this area.

Shrubsteppe Birds

Shrubsteppe birds were surveyed on the Swanson Lakes Wildlife Area in 1997, 1998, and 1999 as part of a larger study examining the effects of habitat fragmentation on populations of shrubsteppe-obligate passerines (Base, Hickman 1999). Surveys were repeated once each month in April, May, and June (May only in 1999). Birds were counted on 5, fixed-diameter point counts (100m diameter) established 200m apart in a big sagebrush/bunchgrass community. All birds seen or heard during each 10 minute point-count were tallied by sex and distance from the survey point. The total number of birds counted each year across all points is presented by species in Table 9.

Table 9. Total number of birds counted on point-count surveys at Swanson Lakes site, 1997-1999.

| Species | 1997* | 1998 | 1999 |
|---|---|---|---|
| American Kestrel | 0 | 1 | 0 |
| American Robin | 1 | 0 | 0 |
| Brown-headed Cowbird | 18 | 20 | 3 |
| Brewer's Blackbird | 1 | 15 | 0 |
| Brewer's Sparrow | 67 | 74 | 17 |
| Common Nighthawk | 1 | 0 | 0 |
| Common Raven | 0 | 4 | 1 |
| Grasshopper Sparrow | 2 | 9 | 0 |
| Horned Lark | 32 | 24 | 6 |
| Killdeer | 1 | 0 | 1 |
| Northern Harrier | 0 | 2 | 0 |
| Ring-necked Pheasant | 0 | 10 | 8 |
| Red-tailed Hawk | 0 | 1 | 0 |
| Red-winged Blackbird | 7 | 1 | 0 |
| Sage Thrasher | 10 | 17 | 5 |
| Savannah Sparrow | 26 | 40 | 6 |
| Short-eared Owl | 0 | 6 | 0 |
| Vesper Sparrow | 18 | 55 | 7 |
| White-crowned Sparrow | 2 | 0 | 0 |
| Western Meadowlark | 18 | 77 | 11 |

* Surveys were run 3 times in 1997 and 1998, and once in 1999.

**g. Facilities and equipment**

The Swanson Lakes Wildlife Area is equipped with suitable farm equipment including tractors, implements, spray trucks, 4 wheeler ATVs, and vehicles. In addition, adequate storage and shop facilities are present as is an on-site office and manager’s residence. The shop is equipped with a full compliment of small and medium size hand tools along with power equipment including drill presses and compressors. The office is equipped with necessary computer hardware and software along with email and fax capabilities.

Swanson Lakes serves as the “maintenance hub” for eastern Washington mitigation project equipment. Wildlife area staff repair and maintain mitigation equipment from several mitigation projects during the winter months. Future potential equipment purchases include replacement vehicles, ATVs, spray equipment, and farming implements.

**h. References**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| | |

JULI A. ANDERSON Wildlife Area Manager, Fish and Wildlife Biologist 3

19602 Seven Springs Dairy Road East
Creston, Washington 99117
Telephone (509) 636-2300

## EXPERIENCE

- **Wildlife Area Manager.** Washington Department of Fish and Wildlife, Creston, WA. 7/94 to present. Manage 20,000-acre Swanson Lakes Wildlife Area for the protection and recovery of the Columbian sharp-tailed grouse, a state-threatened species.

- **Fisheries Biologist.** Saltwater, Inc., Anchorage, AK. 3/90 to 7/94 (multiple short-term contracts). Collect data during commercial fishing operations in Alaska, for the National Marine Fisheries Service in Seattle, WA, for fisheries and marine mammal management.

- **Spotted Owl/Marbled Murrelet Surveyor.** Quinault Indian Nation, Taholah, WA. 3/94 to5/94. Survey Indian forest lands for presence of these threatened species.

- **Spotted Owl Surveyor.** Washington Department of Natural Resources, Castle Rock, WA. 3/94 and 3/93 to 10/93. Survey state forest lands and adjacent forest for presence of this threatened species.

- **Goose Hunt Check Station Operator.** Washington Department of Fish and Wildlife, Vancouver, WA. 11/92 to 1/93, and 11/93 to 1/94. Collect data from Canada Geese bagged during special hunting season and survey flocks for banded/collared geese, for population management.

- **First Lieutenant, Transportation Corps, U.S. Army.** Multiple locations. 6/84 to 11/89. Army Reserve and Active Duty. Second in command of 400-soldier training unit, personnel manager and security/communications officer for 300-soldier truck unit in Korea, platoon leader for 30-soldier truck unit.

## EDUCATION

- **Bachelor of Science, Biology (Wildlife Management).** Central Washington University, Ellensburg, WA, 1986.

- **Army Reserve Officer Training Course.** Central Washington University, Ellensburg, WA, 1984.

- **Military Training:** Army Parachute School, Officer's Vehicle Maintenance Course, Officer's Transportation Course, Fitness Trainer Course, Nuclear/Biological/Chemical Response Course

- **Additional Qualifications and Skills:** pesticide operator's license, pilot car operator's license, 4x4 and ATV handling, private pilot's license, CPR and first-aid certification, personnel management, bookkeeping, 10-key operation, orienteering and map-reading, Habitat Evaluation Procedure (HEP) certification.

## REFERENCES

- Available upon request.

MIKE C. FINCH Wildlife Area Assistant Manager, Fish and Wildlife Biologist 2

16962 Ramsey Road East
Creston, Washington 99117
Telephone (509) 647-2077

## EXPERIENCE

- **Wildlife Area Assistant Manager.** Washington Department of Fish and Wildlife, Creston, WA. 8/94 to present. Assist with management of 20,000-acre Swanson Lakes Wildlife Area for the protection and recovery of the Columbian sharp-tailed grouse, a state-threatened species.

- **Fire Commissioner.** Lincoln County Fire District Seven, Wilbur, WA. 6/98 to present. Manage budgets, personnel, contracts and more, for 520 square-mile district with three stations and 100 volunteer personnel.

- **Maintenance Technician.** Washington State Department of Transportation, Wilbur, WA. 12/90 to 2/98. Seasonal employee. Perform winter maintenance on state highways, including snow removal and de-icing.

- **Farm Owner and Operator.** Finch Farms, Inc., Creston, WA. 10/83 to present. Operate small grain farm with up to 3000 acres in all phases of production, using good soil conservation practices. Manage hired personnel, budgets, and equipment fleet.

## EDUCATION

- **Associate of Arts, Aviation.** Big Bend Community College, Moses Lake, WA, 1983. Classes included full program of math, chemistry and biology. Flight licenses include Certified Flight Instructor, Commercial Rating, and Instrument Rating.

- **Seattle University, 9/79 to 5/81**. Math major. Transferred out to attend aviation program at Big Bend Community College.

- **Additional Qualifications and Skills:** commercial driver's license, pesticide operator's license, pilot car operator's license, 4x4 and ATV handling, CPR and first-aid certification, personnel management, bookkeeping, map-reading, Habitat Evaluation Procedure (HEP) certification.

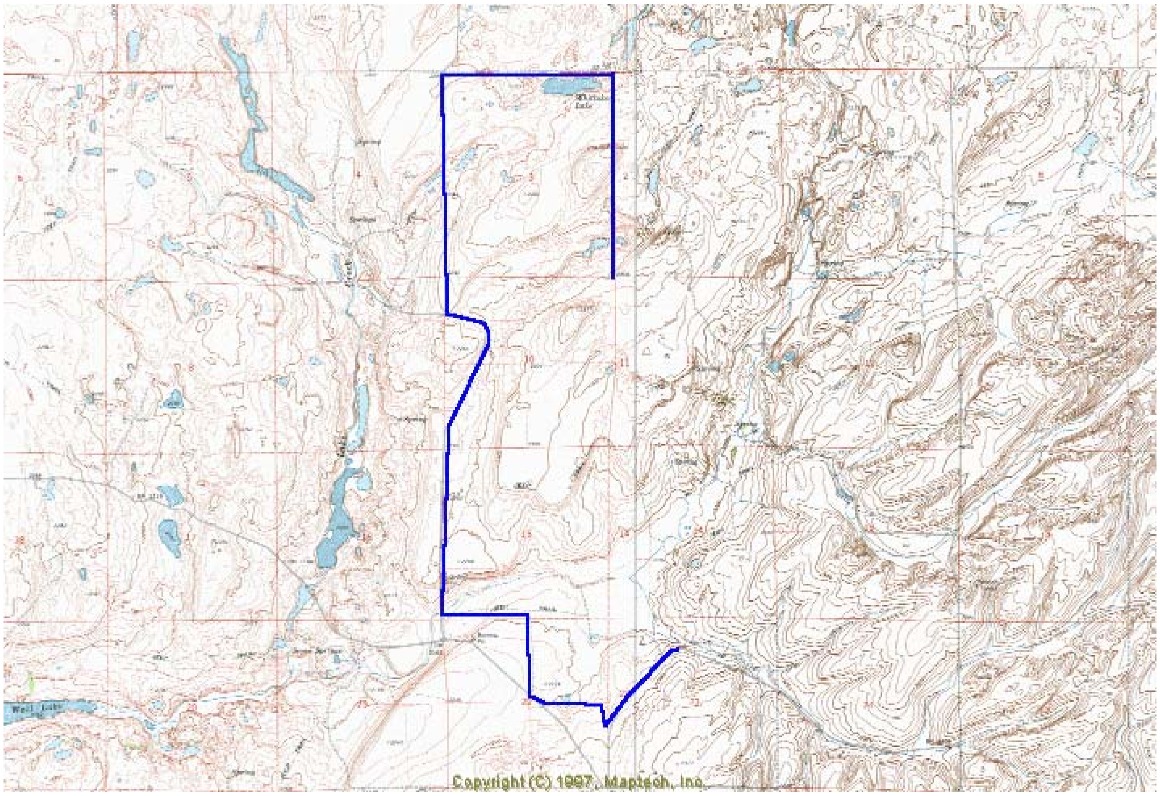
## REFERENCES

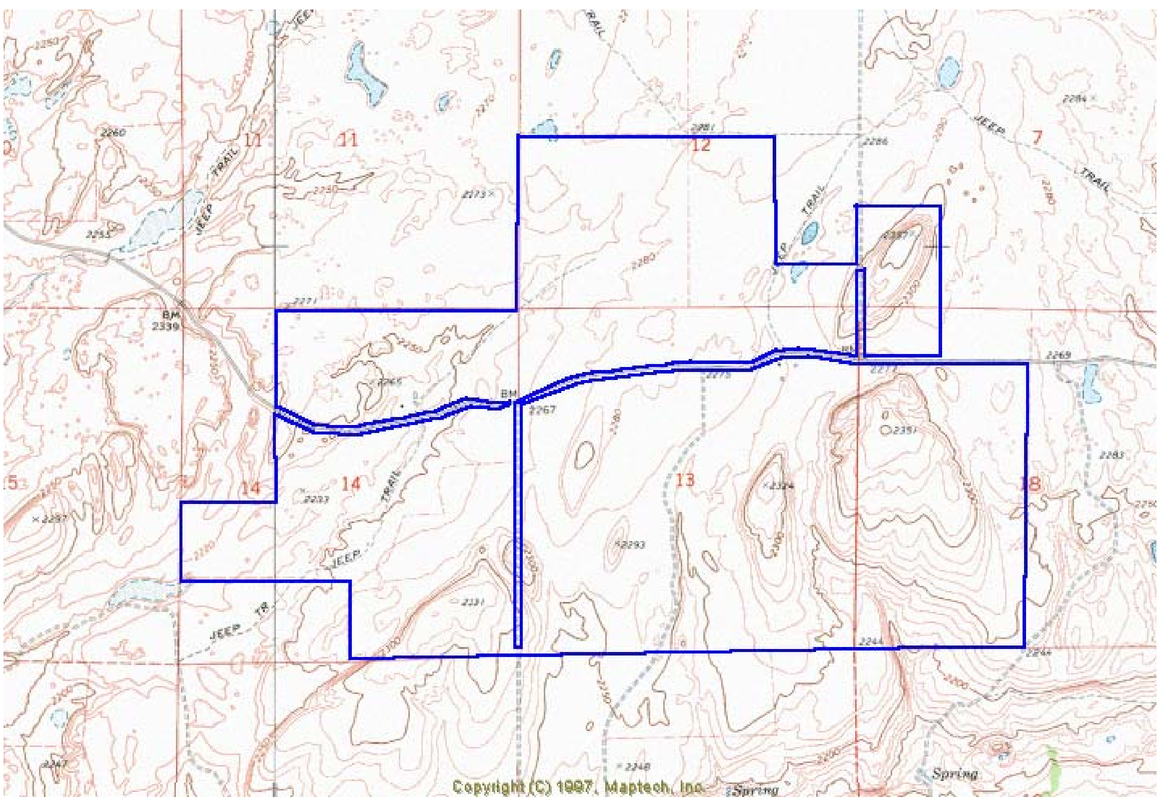
- Available upon request.

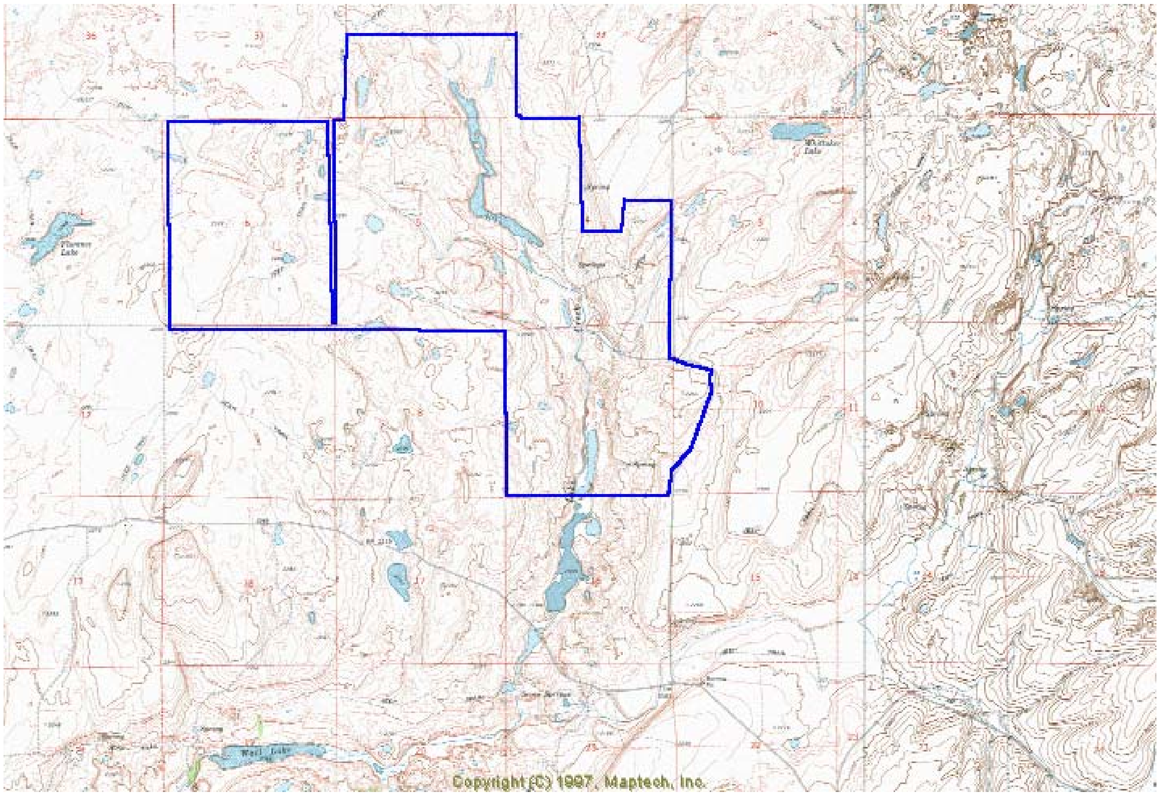
### ADDITIONAL STAFF

In addition to permanent SLWA management staff, a temporary technician is employed for 6 months each year (paid with project funds), while a four member regional Washington Conservation Corps Crew (WCC) assists with fence maintenance, weed control and other labor-intensive activities. WDFW wildlife biologists assist SLWA staff with monitoring wildlife populations and vegetation. WDFW Vegetation Management Team Members assist with design and implementation of habitat manipulation/farming practices.

Appendix A: Swanson Lakes Wildlife Area new fence construction maps.




Whittaker Lake
West Lake
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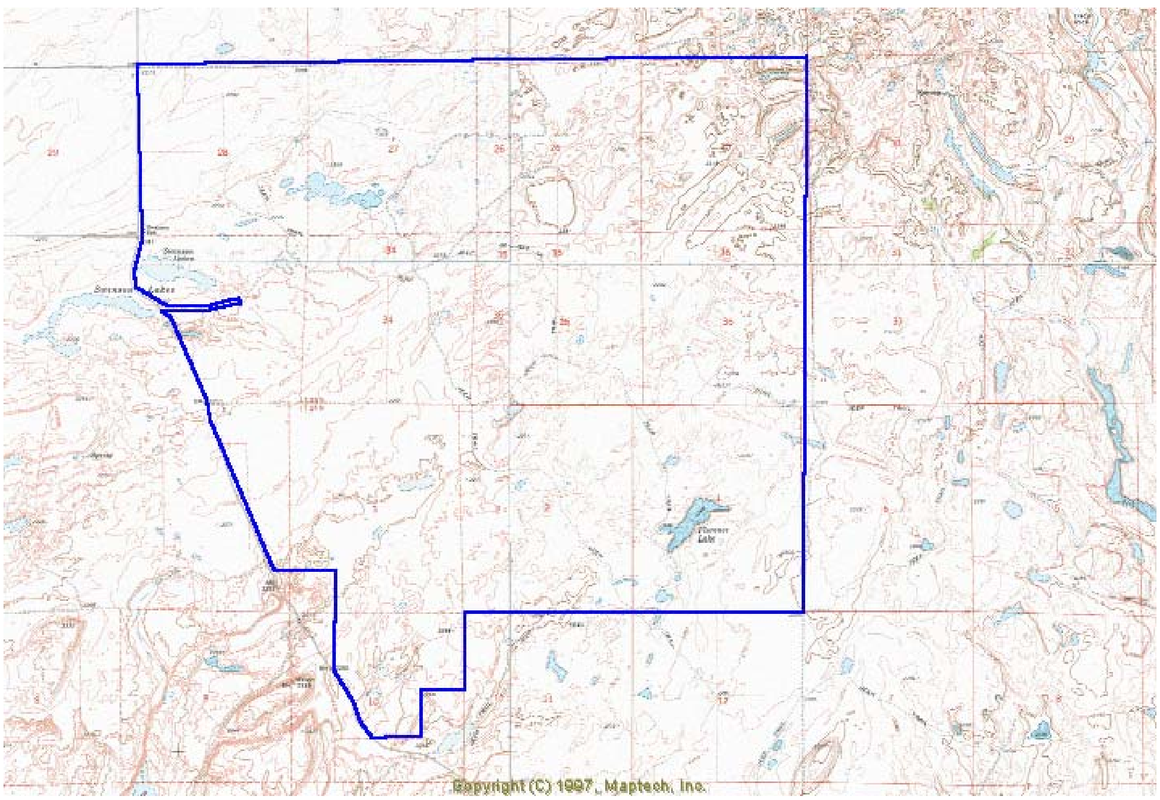
Swenson Lakes
Florence Lake
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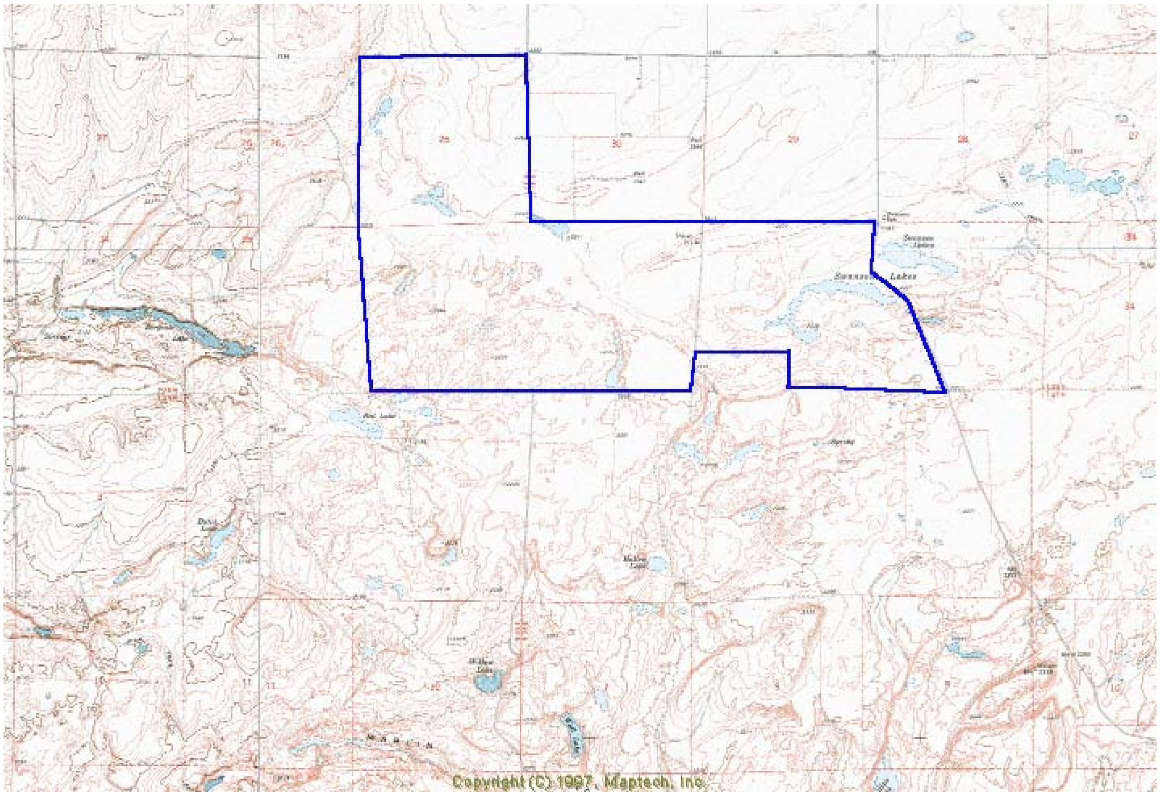
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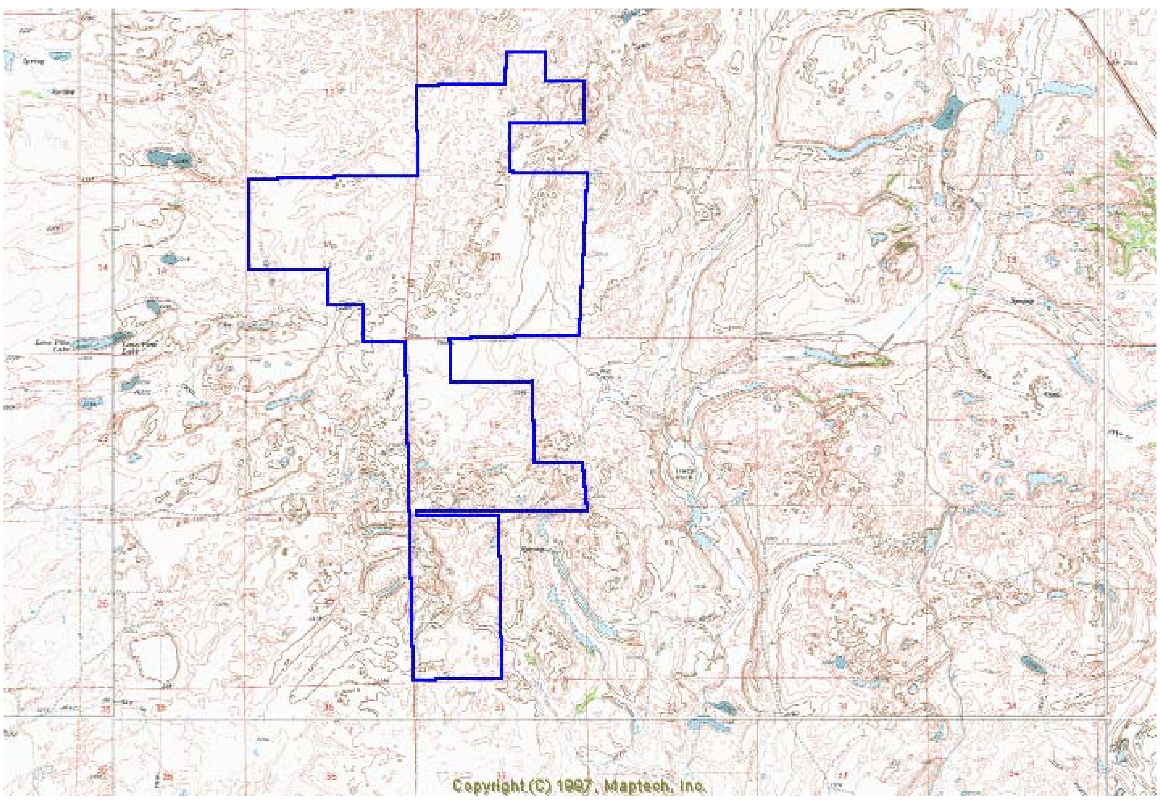
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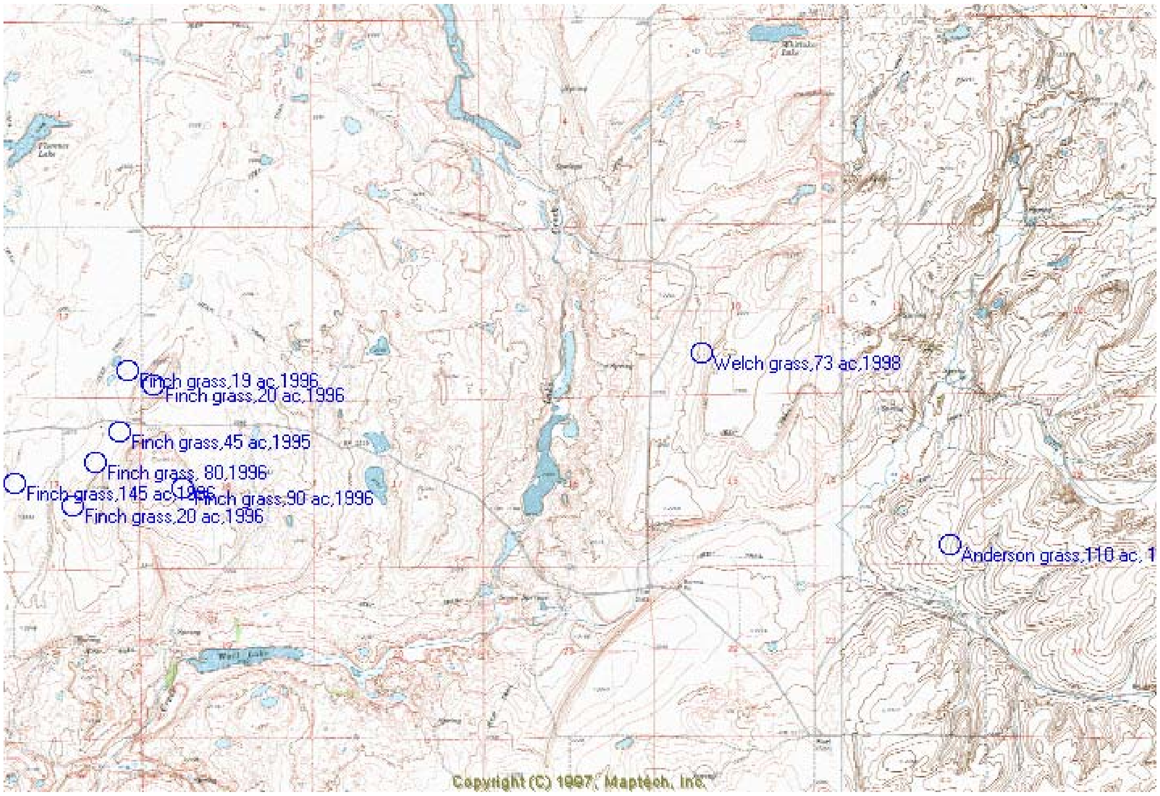
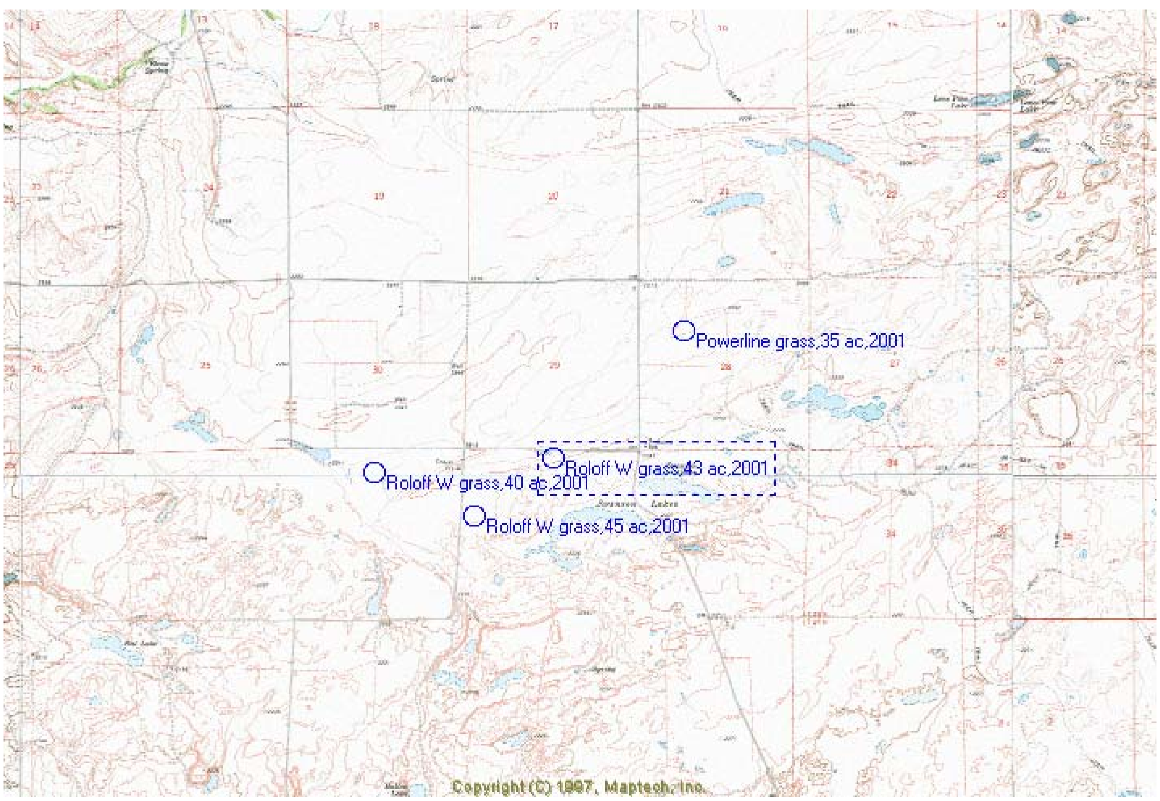
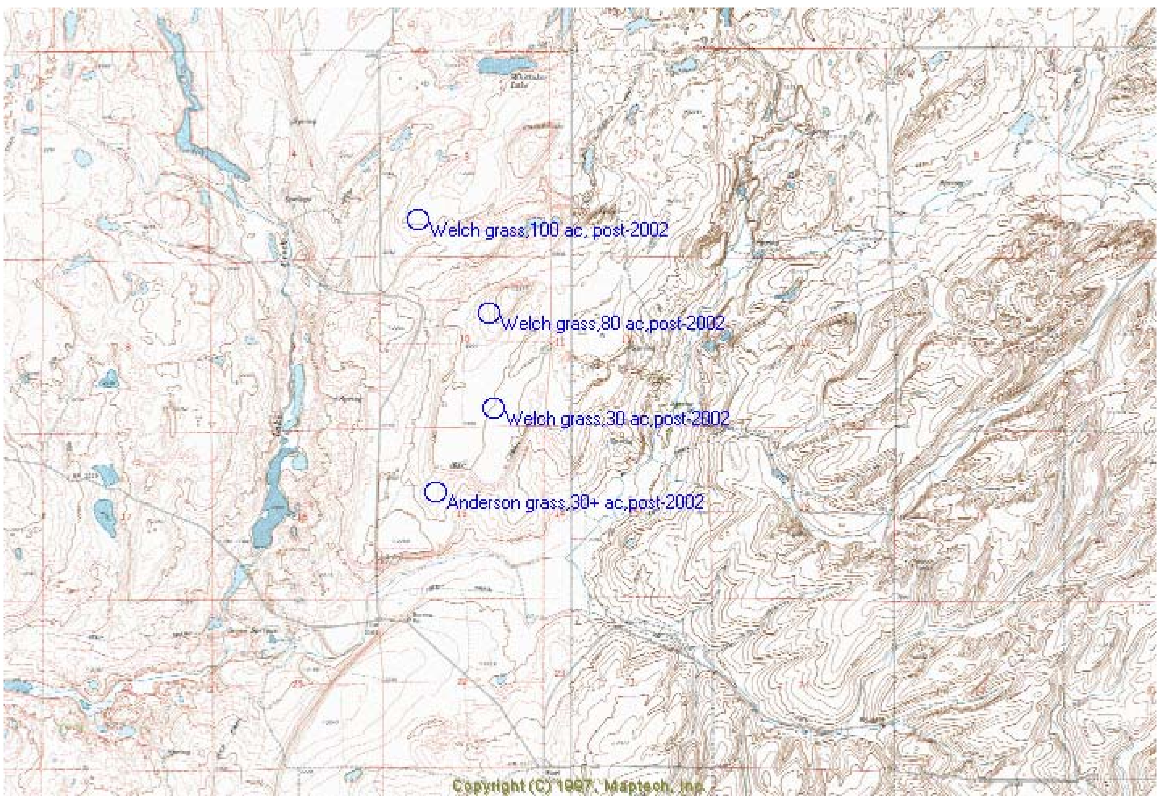
Appendix B. Location maps for past and future grassland enhancements.




Congratulations!

2. SECOND DOCUMENT:

## PART 1 of 2. Administration and Budgeting

### Section 1 of 10. General administrative information

**Title of project**

# Swanson Lakes Wildlife Area (SLWA)

**BPA project number** 199106100

**Business name of agency, institution or organization requesting funding**
Washington Department of Fish and Wildlife

**Business acronym (if appropriate)** WDFW

**Proposal contact person or principal investigator:**


| | |
|---|---|
| **Name** | Paul R. Ashley |
| **Mailing Address** | 8702 N. Division |
| **City, ST Zip** | Spokane, WA 99218 |
| **Phone** | (509) 456-2823 |
| **Fax** | (509) 456-4071 |
| **Email address** | ashlepra@dfw.wa.gov |


**Manager of program authorizing this project** Jenene Fenton

**Subbasin in Columbia Plateau Province**
Crab Creek

**Location of the project**

| Latitude | Longitude | Description |
|---|---|---|
| 47 40.53 | 118 26.56 | Point on northern boundary of the SLWA. Approximately 10 miles south of Creston, Washington. |
| 47 32.15 | 118 22.59 | Point on southern boundary of the SLWA. |
| 47 37.37 | 118 36.44 | Point on western boundary of the SLWA. |
| 47 33.47 | 118 21.25 | Point on eastern boundary of the SLWA. |

**Target species**
Sharp-tailed Grouse, Sage Grouse, mule deer, shrub-steppe obligate species

**Short description**
Protect, increase, and maintain a viable sharp-tailed grouse meta population, re-establish a viable sage grouse population, increase mule deer use of the project site, and enhance shrubsteppe habitat for shrub-steppe obligate species.

Information transfer

The expected outcomes of this project are (check one)
☐ quantitative ☒ qualitative ☐ indirect

Data generated by this project are (check one)
☒ primary ☒ derived ☐ indirect

Are there restrictions on the use of the data? (check one)
☒ none ☐ non-commercial use only
☐ educational use only ☐ requires prior approval
☐ sensitive ☐ proprietary, no public distribution

Where do the data reside (check one or more)?
Private/managed locally: ☒ printed ☒ electronic
Public access:
Printed at ☒ BPA ☐ Peer-reviewed journal or other
Internet at ☐ BPA ☐ StreamNet ☐ Fish Passage Center
☐ DART or other web address

If your project has research and monitoring components, have you added or updated your project at the Columbia River Ecosystem Research and Monitoring inventory (www.cbfwa.org/find)?
☐ yes, on this date ☒ no ☐ not applicable

**In what other ways will information from this project be transferred or used?**

Information derived from this project will be used to improve wildlife/habitat management techniques on mitigation and non-mitigation wildlife areas and will be provided to CBFWA project managers and other interested parties either electronically or in hard copy reports.

## Section 2 of 10. Past accomplishments

| Year | Accomplishment |
|---|---|
| 1992 | Conducted sharp-tailed grouse Lek surveys. Counted 24 grouse displaying on 6 leks. |
| | Conducted baseline HEP surveys. |
| 1993 | Acquired the 4,208 ha (10,399 ac) Roloff property as the "core" sharp-tailed grouse area within WDFW's Sharp-tailed Grouse Management Zone 4 and Sage Grouse Management Zone 1. |
| | Conducted sharp-tailed grouse Lek surveys. Counted 41 grouse displaying on 6 leks. |
| 1994 | Conducted sharp-tailed grouse Lek surveys. Counted 20 grouse displaying on 5 leks. |
| 1995 | Expanded the "core area" by acquiring the 2,478 ha (5060 ac) Welch/Anderson properties, the 97 ha (240 ac) Rustemeyer/Finch ranch, and adding the 1,214 ha (3000 ac) Tracy Rock parcel purchased by WDFW. |
| | Controlled non-native weedy vegetation on 193 ha (478 ac). |
| | Coordinated sharp-tailed grouse management activities with the Bureau of Land Management (BLM owns approximately 15,000 ac) adjacent to the SLWA project. |
| | Conducted sharp-tailed grouse Lek surveys. Counted 62 grouse displaying on 6 leks. |
| 1996 | Seeded 210 ha (520 ac)of agricultural land to native-like perennial grasses and forbs for sharp-tailed grouse nesting and brood rearing habitat. Planted 18,400 shrubs and trees for sharp-tailed grouse winter forage and loafing/roosting cover. |
| | Seeded 97 ha (240 ac) to small grains in order to supplement sharp-tailed grouse winter feed while shrubs, trees, and native herbaceous cover is established (Finch Management Unit). |
| | Purchased 119 ha (295 ac) of habitat to preserve a sharp-tailed grouse lek site and adjoining nesting habitat as well as protect the area from further anthropogenic disturbance/development. |
| | Constructed 27 km (16 mi) of fence to protect habitat from livestock encroachment. |
| | Controlled non-native weedy vegetation on 367 ha (906 ac). |
| | Conducted sharp-tailed grouse Lek surveys. Counted 55 grouse displaying on 7 leks. |
| 1997 | Converted 12 ha (30 ac) of agricultural land to native-like perennial grasses and forbs for sharp-tailed grouse nesting and brood rearing habitat. Planted an additional 23,500 shrubs and trees primarily for winter forage and thermal cover. Seeded |
| | 6 ha (15 ac) to small grains for sharp-tailed grouse supplemental winter feed (Roloff Management Unit). |
| | Developed 16 ha (40 ac) of sharp-tailed grouse nesting/brood rearing habitat on the Roloff West Management Unit. |
| | Purchased 321 ha (792 ac) of shrub-steppe habitat to link disjunct parcels and further protect habitat/wildlife values on SLWA. |
| | Established permanent monitoring and evaluation transects. |
| | Constructed 26 km (16 mi) of fence and repaired an additional 19 km (12 mi) of fence to protect habitat from livestock encroachment. |
| | Controlled non-native weedy vegetation on 342 ha (846 ac). |
| | Conducted sharp-tailed grouse Lek surveys. Counted 57 grouse displaying on 7 leks. |
| 1998 | Constructed 27 ha (17 mi) of fence and repaired an additional 7 km (4.5 mi) of fence to protect habitat from livestock encroachment. |
| | Obtained fire control contracts to protect shrub-steppe habitat from wildfires. |
| | Controlled non-native weedy vegetation on 223 ha. (552 ac). |
| | Conducted sharp-tailed grouse Lek surveys. Counted 48 grouse displaying on 8 leks. |
| 1999 | Controlled non-native weedy vegetation on 178 ha (440 ac). |
| | Completed the Cultural Resource Survey. |
| | Constructed 3.2 km (2 mi) of fence and performed routine maintenance on an additional 96 km (60 mi) of fence. |
| | Assisted Scotch Creek WA staff seed 162 ha (400 ac) to native-like sharp-tailed grouse nesting and brood rearing habitat. |
| | Maintained seeded fields. |
| | Conducted sharp-tailed grouse Lek surveys. Counted 62 grouse displaying on 8 leks. |
| 2000 | Constructed 0.4 km (0.25 mi) of new fence and maintained 96 km (60 mi) of existing fence to protect habitat from livestock encroachment and vehicle trespass. |
| | Conducted sharp-tailed grouse Lek surveys. Counted 49 grouse displaying on 8 leks. |
| | Conducted jackrabbit surveys. No rabbits were observed; however, tracks were detected. |
| | Captured and banded 15 ducks on the SLWA to compliment WDFW/USFWS migration tracking efforts. |
| | Conducted neo tropical bird surveys. |
| | Conducted hunter harvest surveys (mule deer, waterfowl, and upland birds). |
| | Replicated 1992 HEP surveys (results included in Part 2) and established permanent vegetation monitoring transects. |
| | Conducted fertilizer trials on restored grasslands (results included in Part 2). |
| | Constructed six bat boxes to mitigate for a razed structure that was used by little brown bats. |
| | Controlled introduced weedy vegetation on 101 ha (250 ac) of shrubsteppe habitat |

| Year | Accomplishment |
|---|---|
| | |

## Section 3 of 10. Relationships to other projects

| Project # | Project title/description | Nature of relationship |
|---|---|---|
| 199609400 | Scotch Creek Wildlife Area | Supports this project and WDFW goals and objectives |
| 1994044 | Sagebrush Flat Wildlife Area (Douglas County Pygmy Rabbit Project) | Supports this project and WDFW goals and objectives |
| 21034 | Colville Tribes restore habitat for sharp-tailed grouse | Supports Tribal (CCT) and WDFW goals and objectives |
| 199204800 | Hells Gate big game winter range wildlife mitigation project | Supports Tribal (CCT) and WDFW goals and objectives |
| | | |

## Section 4 of 10. Estimated budget for Planning & Design phase

**Task-based estimated budget**

| Objective (1. text, 2. text...) | Task (a. text, b. text...) | Task duration in FYs |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | Total |

**Out year objective-based estimated 2003 - 2006 budget**

| Objective (1. text, 2. text...) | Starting FY | Ending FY |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**Out year estimated budgets**

| | FY 2003 | FY 2004 | FY 2005 | FY 2006 |
|---|---|---|---|---|
| Total budget | | | | |

## Section 5 of 10. Estimated budget for Construction/Implementation phase

**Task-based estimated budget**

| Objective (1. text, 2. text...) | Task (a. text, b. text...) | Task duration in FYs |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | Total |

**Out year objective-based estimated 2003 - 2006 budget**

| Objective (1. text, 2. text...) | Starting FY | Ending FY |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**Out year estimated budgets for construction/implementation phase**

| | FY 2003 | FY 2004 | FY 2005 | FY 2006 |
|---|---|---|---|---|
| Total budget | | | | |

Section 6 of 10. Estimated budget for Operation & Maintenance phase

**Task-based estimated budget**

| Objective (1. text, 2. text...) | Task (a. text, b. text...) | Task duration in FYs |
|---|---|---|
| 1. Increase the number of sharp-tailed grouse from approximately 180 to 400 by 2010. | a. Translocate sharp-tailed grouse to the SLWA for genetic augmentation purposes to improve long-term population viability. | 4 |
| | b.Monitor and control recreational use of project lands. | ongoing |
| 2. Implement management activities and schedules described in the SLWA Enhancement Plan | a. Control introduced vegetation. | ongoing |
| | b. Maintain sharp-tailed grouse nesting and brood rearing habitat enhancements. | ongoing |
| | c. Maintain shrub and tree enhancements. | ongoing |
| | d. Maintain 96 km (60 mi) of boundary fence to protect habitat from trespass livestock grazing and vehicle encroachment. | ongoing |
| | e. Maintain all project related equipment and machinery. | ongoing |
| | f. Maintain project infrastructure and physical improvements including roads, signs, culverts, wells, buildings etc., to the extent necessary to implement the management plan. | ongoing |
| | g. Coordinate protection, enhancement, and maintenance activities with BLM, DNR, adjacent landowners, and public interests. | ongoing |
| | h. Provide adequate fire protection to include surveillance and fire fighting resources. | ongoing |
| | i. Conduct grassland fertilzer trials | 3 |
| | j. Construct 2.5 miles of new fence | 2 |
| | | Total |

**Out year objective-based estimated 2003 - 2006 budget**

| Objective (1. text, 2. text...) | Starting FY | Ending FY |
|---|---|---|
| 1. Increase the number of sharp-tailed grouse from approximately 180 to 400 by 2010. | 2003 | 2006 |
| 2. Implement management activities and schedules described in the SLWA Enhancement Plan | 2003 | 2006 |
| | | |
| | | |

**Out year estimated budgets for operations & maintenance phase**

| | FY 2003 | FY 2004 | FY 2005 | FY 2006 |
|---|---|---|---|---|
| Total budget | $210,137 | $200,137 | $200,137 | $200,137 |

Section 7 of 10. Estimated budget for Monitoring & Evaluation phase

**Task-based estimated budget**

| Objective (1. text, 2. text...) | Task (a. text, b. text...) | Task duration in FYs |
|---|---|---|
| 1.Conduct research on sharp-tailed grouse on the SLWA through 2005 in conjunction with WDFW's statewide sharp-tailed grouse research program. | a.Monitor sharp-tailed grouse leks annually. | ongoing |
| | b. Search SLWA and adjacent areas for satellite/new leks annually. | ongoing |
| | c.Conduct sharp-tailed grouse nesting and brood surveys annually. | ongoing |
| | d. Correlate population responses to habitat alterations. | ongoing |
| 2. Monitor wildlife and habitat response to protection, maintenance, and enhancement | a. Conduct surveys for sage grouse. | ongoing |

| Objective (1. text, 2. text...) | Task (a. text, b. text...) | Task duration in FYs |
|---|---|---|
| measures annually. | | |
| | b. Conduct annual neotropical bird surveys. | ongoing |
| | c. Conduct big game (deer) surveys. | ongoing |
| | d. Conduct hunter harvest surveys. | ongoing |
| | e. Monitor existing HEP and vegetation transects and establish new permanent vegetation transects. | ongoing |
| | f. Conduct HEP analysis and establish vegetation transects on new acquisitions/project lands. | 2 |
| | | |
| | | Total |

### Out year objective-based estimated 2003 - 2006 budget

| Objective (1. text, 2. text...) | Starting FY | Ending FY |
|---|---|---|
| 1.Conduct research on sharp-tailed grouse on the SLWA through 2005 in conjunction with WDFW's statewide sharp-tailed grouse research program. | 2003 | 2006 |
| 2. Monitor wildlife and habitat response to protection, maintenance, and enhancement measures annually. | 2003 | 2006 |
| | | |
| | | |

### Out year estimated budgets for monitoring & evaluation phase

| | FY 2003 | FY 2004 | FY 2005 | FY 2006 |
|---|---|---|---|---|
| Total budget | $80,000 | $65,000 | $65,000 | 65000 |

## Section [illegible]f 10. Estimated budget summary

### Itemized estimated budget

| Item | Note | FY 2002 |
|---|---|---|
| Personnel | FTE: 2.5- Bio III (12 months), Bio II (9 months), Laborer (9 months), Bio IV (0.25 months) | 101,460 |
| Fringe benefits | For staff outlined under "Personnel" | 25,370 |
| Supplies, materials, non-expendable property | Fuel, herbicides, maintenance materials, utilities, bldg. maint., signs, training, equipment, etc. | 82,015 |
| Travel | Herbicide applicator license courses etc. | 2,000 |
| Indirect costs | Computed at 25.2% | 54,393 |
| Capital acq[illegible]ions or improvements (e.g. land, buildi[illegible] major equip. over $10,000) | N/A | 0 |
| NEPA costs | N/A | 0 |
| PIT tags @$2.25/ea | # of tags: N/A | 0 |
| Subcontractor | Fire Districts (5,000), Fencing Contractor ($20,000) | 25,000 |
| Other | Farm dsik and moldboard plow | 6,000 |
| Total BPA funding request | | $296,238 |

### Total estimated budget

| | |
|---|---|
| Total FY 2002 project cost | $296,238 |
| Amount anticipated from previously committed BPA funds | - $0 |
| [illegible] FY 2002 budget request | $296,238 |
| [illegible]002 forecast from FY 2001 | $256,000 |
| [illegible]ange from forecast | 15.7% increase |

**[illegible]son for change in estimated budget**
[illegible]ncing [illegible] associated with new acquisitions and increased monitoring and evaluation activities.

**Reason [illegible]hange in scope**
The scop[illegible]s changed to include additional sharp-tailed grouse research and re-introduction strategies in order to facilitate sharp-tailed grouse population growth at the SLWA.

## Cost sharing

| Organization | Item or service provided | Amount ($) | Cash or in-kind? |
|---|---|---|---|
| WDFW | Assistance with wildlife and vegetation surveys and habitat enhancement planning (non project wildlife biologists, vehicles etc.). | 10,000 | in-kind |
| WDFW | Washington Conservation Corps crew assists with fence maintenance etc. | 4,000 | in-kind |
| | | | cash |
| | | | cash |
| Total cost-share | | $14,000 | |

## Out year budget totals

| | FY 2003 | FY 2004 | FY 2005 | FY 2006 |
|---|---|---|---|---|
| Planning & design phase | 0 | 0 | 0 | 0 |
| Construction/impl. phase | 0 | 0 | 0 | 0 |
| O & M phase | 210,137 | 200,137 | 200,137 | 200,137 |
| M & E phase | 80,000 | 65,000 | 65,000 | 65,000 |
| Total budget | $290,137 | $265,137 | $265,137 | $265,137 |

**Other budget explanation**

Part 1 of 2 complete!
Press Alt-C to calculate totals on the document. If any totals don't match, you'll see a message.
Then save this document, and open "narrative.doc" to begin Part 2 which includes Sections 9-10.